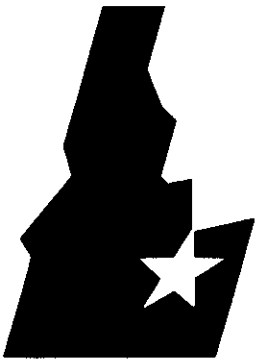
DOE/ID-10522
August 1997
Revision 5

Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B



Idaho National Engineering Laboratory

U.S. Department of Energy • Idaho Operations Office

DOE/ID-10522
Revision 5

Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B

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Assistant Secretary for Environmental Management
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SIGNATURE PAGE

T.S. Green
LMITCO WAG 1 PBS Manager

8/11/97
Date

A.E. Jantz
LMITCO Project Manager

8-11-97
Date

J.S. Rothermel
RD/RA Project Manager

8/11/97
Date

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ACRONYMS

AAC	acceptable ambient concentrations
APC	air pollution control
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
D&D	decontamination and dismantlement
DCE	dichloroethene
DEQ	Division of Environmental Quality
DMP	Data Management Plan
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DPTU	Dissolved Phase Treatment Units
EL	emission levels
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences (June 1997)
F&OR	Functional and Operational Requirements
FDR	Field Demonstration Report
FEWP	Field Evaluation Work Plan
FFA/CO	Federal Facility Agreement and Consent Order
GWTF	Groundwater Treatment Facility
IDAPA	Idaho Air Pollution Act
IDHW	Idaho Department of Health and Welfare

IDWR	Idaho Department of Water Resources
INEEL	Idaho National Engineering and Environmental Laboratory
ISB	in situ bioremediation
ISCO	in situ-chemical oxidation
LCC	Life Cycle Cost
LDR	Land Disposal Regulations
MCL	maximum contaminant level
NA	natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act of 1969
NGWTF	New Groundwater Treatment Facility
NPTF	New Pump and Treat Facility
O&M	operations and maintenance
OU	operable unit
PCE	perchoroethene (aka tetrachloroethene)
RCRA	Resource Conservation and Recovery Act
RA	remedial action
RAO	Remedial Action Objective
RD	remedial design
RD/RA	Remedial Design/Remedial Action
RD/RAWP	Remedial Design/Remedial Action Work Plan
ROD	Record of Decision (August 18, 1995)
SOW	Scope of Work
TAN	Test Area North

TCE	trichloroethene (aka trichloroethylene)
TEWP	Technology Evaluation Work Plan
TIW	Technical Impracticability Waiver
TSD	treatment, storage, and disposal
TSF	Technical Support Facility
U.S.	United States
VOC	volatile organic compound
WCE	Well Characterization Evaluation

Remedial Design/Remedial Action Scope of Work Test Area North Final Groundwater Remediation Operable Unit 1-07B

1. INTRODUCTION

In accordance with the Idaho National Engineering and Environmental Laboratory (INEEL) Federal Facility Agreement and Consent Order (FFA/CO), the United States (U.S.) Department of Energy Idaho Operations Office (DOE-ID) submits the following revised Remedial Design/Remedial Action (RD/RA) Scope of Work (SOW) for the remediation of the Test Area North (TAN) Technical Support Facility (TSF) injection well (TSF-05) and surrounding groundwater contamination (TSF-23). These areas have been designated as operable unit (OU) 1-07B. This remedial action (RA), as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, will proceed in accordance with the signed OU 1-07B Record of Decision (ROD), dated August 18, 1995, and Explanation of Significant Differences (ESD), dated June 1997. This revision of the RD/RA SOW supersedes revision four, published December 1995.

This RD/RA SOW has been prepared for remedial design (RD) of Phases A, B, and C through the initiation of RA. The FFA/CO requirements for a RD Work Plan are incorporated into this RD/RA SOW. Therefore, a RD Work Plan will not be prepared for separate submittal.

This RD/RA SOW includes a brief project summary, unresolved issues, scope of RD/RA activities, associated deliverables, milestone log, schedule, plans to expedite the project, cost estimate, regulatory requirements, design approval procedures, correlation between plans and specifications, and Community Relations Plan elements.

1.1 Background

Background information for the TSF-05 injection well including location, disposal history, sampling, and previous removal and remedial activities are not discussed in this RD/RA SOW. Background information can be found in any of the following:

- *Record of Decision, Declaration for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action, Operable Unit 1-07B,* Waste Area Group 1, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, August 1995

- EGG-ER-10643, Remedial Investigation Final Report with Addenda for the Test Area North Groundwater Operable Unit 1-07B at the Idaho National Engineering Laboratory, Revision 0, U.S. Department of Energy, Idaho, January 1994

- EGG-ER-10802, Feasibility Study Report for Test Area North Groundwater Operable Unit 1-07B at the Idaho National Engineering Laboratory, Revision 0, U.S. Department of Energy, Idaho, January 1994

- *Record of Decision, Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23), Operable Unit 1-07A*, Waste Area Group 1, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, September 1992

- DOE-ID/12583-152, *Remedial Design and Remedial Action Guidance for the Idaho National Engineering Laboratory*, Revision 1, U.S. Department of Energy, Idaho, October 1993

- *Test Area North Groundwater Interim Action, Operable Unit 1-07A Final Remedial Design*, Revision 3, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, December 1993

- *Final Remedial Action Work Plan, Test Area North Groundwater Interim Action Operable Unit 1-07A*, Revision 3, 01.07A.2.1.201.01, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, November 1993

- DOE/ID-10558, *Well TSF-05 Surge and Stress Evaluation Report for Operable Unit 1-07B*, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, February 1997

- DOE/ID-10562, *Technology Evaluation Work Plan Test Area North Final Groundwater Remediation Operable Unit 1-07B (Draft)*, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, March 1997

- *Final Progress Report for Batches 1 through 31 Test Area North Groundwater Interim Action Operable Unit 1-07A*, Revision 3, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, April 1995

- *Final Sampling, Analysis, and Test Plan for Test Area North Phase 0 Activities, Operable Unit 1-07A*, Revision 4, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, May 1995.

Figure 1-1 shows the location of TAN within the INEEL. Figure 1-2 shows the location of TSF-05 and the associated trichloroethene (TCE) groundwater contamination plume. The plume size is approximate, based on available information. Table 1-1 lists the organic contaminants of concern, radionuclides detected, and their corresponding range of concentrations.

1.2 Summary of the Proposed Remedial Action

The selected remedy for OU 1-07B is intended to reduce the contamination in the groundwater at TAN to ensure that offsite populations are not at risk in the future and that the future residents would not be at risk from use of TAN groundwater if the TAN area were converted to the public domain at any time in the future. The ROD implements the selected remedy in three phases: Phase A - Transition of OU 1-07A Interim Action to OU 1-07B Final Remedial Action; Phase B - Hotspot Containment and/or Removal with Treatability Studies; and Phase C - Dissolved Phase Groundwater Treatment with Continuation of Hotspot Containment and/or Removal. Further description of the action is contained in the ROD and the ESD.

1.3 Performance Standards and Design Criteria

For the existing Groundwater Treatment Facility (GWTF), groundwater will be treated for removal of volatile organic compounds (VOCs) with single pass treatment and subsequent reinjection into the aquifer at concentrations that exceed maximum concentration levels (MCLs). Single pass treatment for radionuclides will only occur during surge and stress of TSF-05 and will also result in reinjection into the aquifer at concentrations that exceed MCLs. For new treatment systems, design criteria will be established to meet the performance standards identified in the ROD as modified by the ESD.

1.4 Remedial Action Objectives

The remedial action objectives (RAO) are identified in the OU 1-07B ROD, Section 9.2, and ESD. The summary of the RAOs are listed below:

- Phase A - Remove as much of the secondary source as possible from the vicinity of the TSF-05 injection well by physically and hydraulically stressing the well.
- Phase B - Prevent, to the maximum extent practicable, migration of contaminated groundwater beyond the hotspot at levels above MCLs.
- Phase C - Capture and treat a sufficient portion of the dissolved phase plume beyond the hotspot to provide for aquifer cleanup within 100 years of the date of ROD signature.

1.5 Participating Organizations

The DOE-ID, Environmental Protection Agency (EPA) Region 10, and Idaho Department of Health and Welfare (IDHW) are cosignatories to the FFA/CO and have regulatory authority for the cleanup at the INEEL. The U.S. Department of Energy (DOE) is responsible for the overall management and funding of the Environmental Restoration Program at the INEEL in compliance with all governing federal and state statutes and regulations.

1.6 Data Management and Quality Assurance

Data collected during the activities associated with OU 1-07B RD/RA will be managed in accordance with the Data Management Plan (DMP) for OU 1-07B. Such activities may include groundwater monitoring, hydrogeological testing, treatability studies, and groundwater treatment system operations. The DMP will be updated as necessary to ensure all categories of data generated during project activities are addressed.

Data quality objectives will be established to ensure that quality assured data is obtained and managed to support making defensible decisions concerning RA activities. Sampling, sample analysis, and data validation will be performed in accordance with the Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, and 10, INEL-95/0086. All RD and RA activities will be planned in accordance with the requirements of the Quality Program Plan for Environmental Restoration, PLN-125.

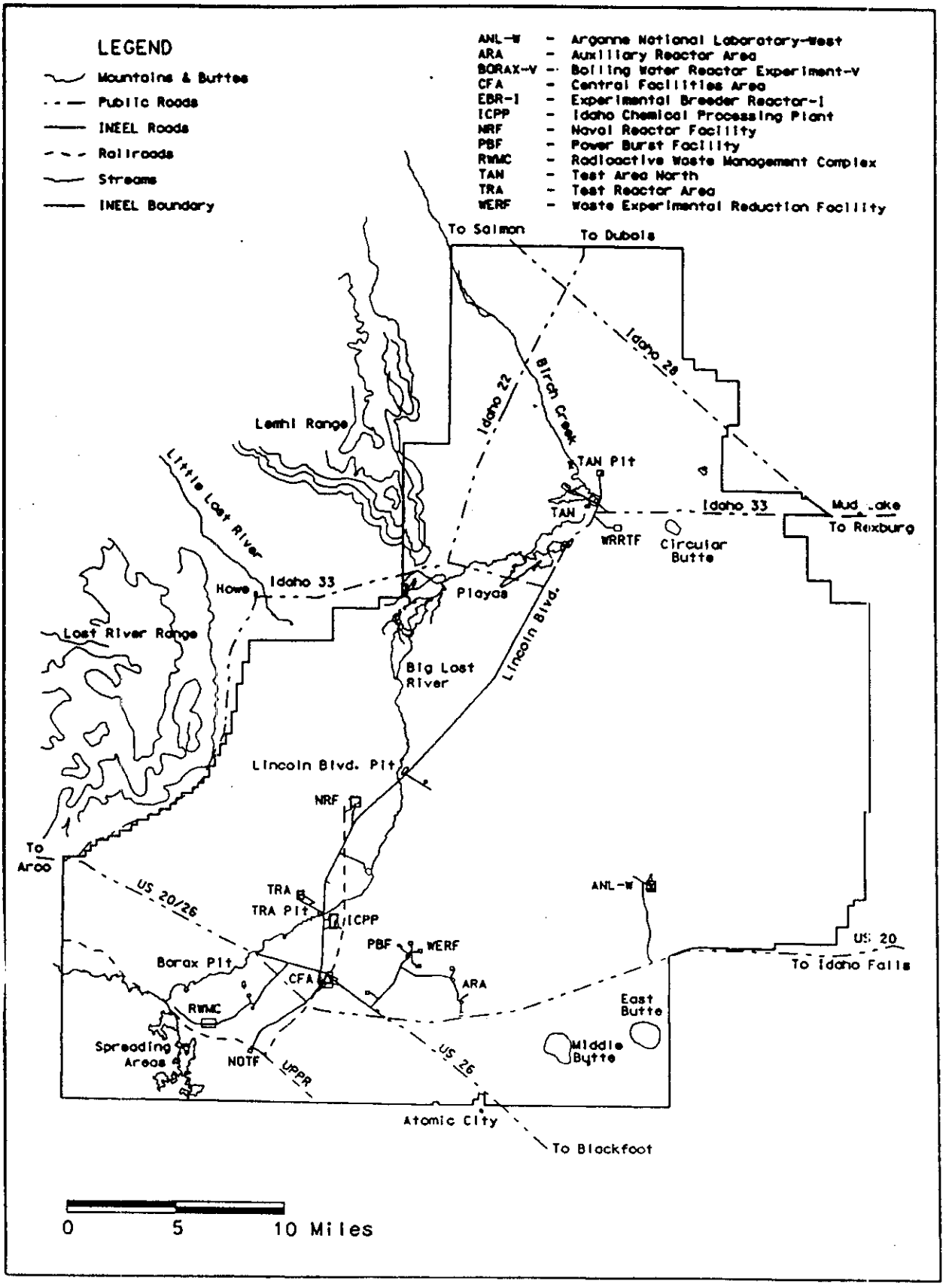

Figure 1-1. Location of the INEEL and TAN.

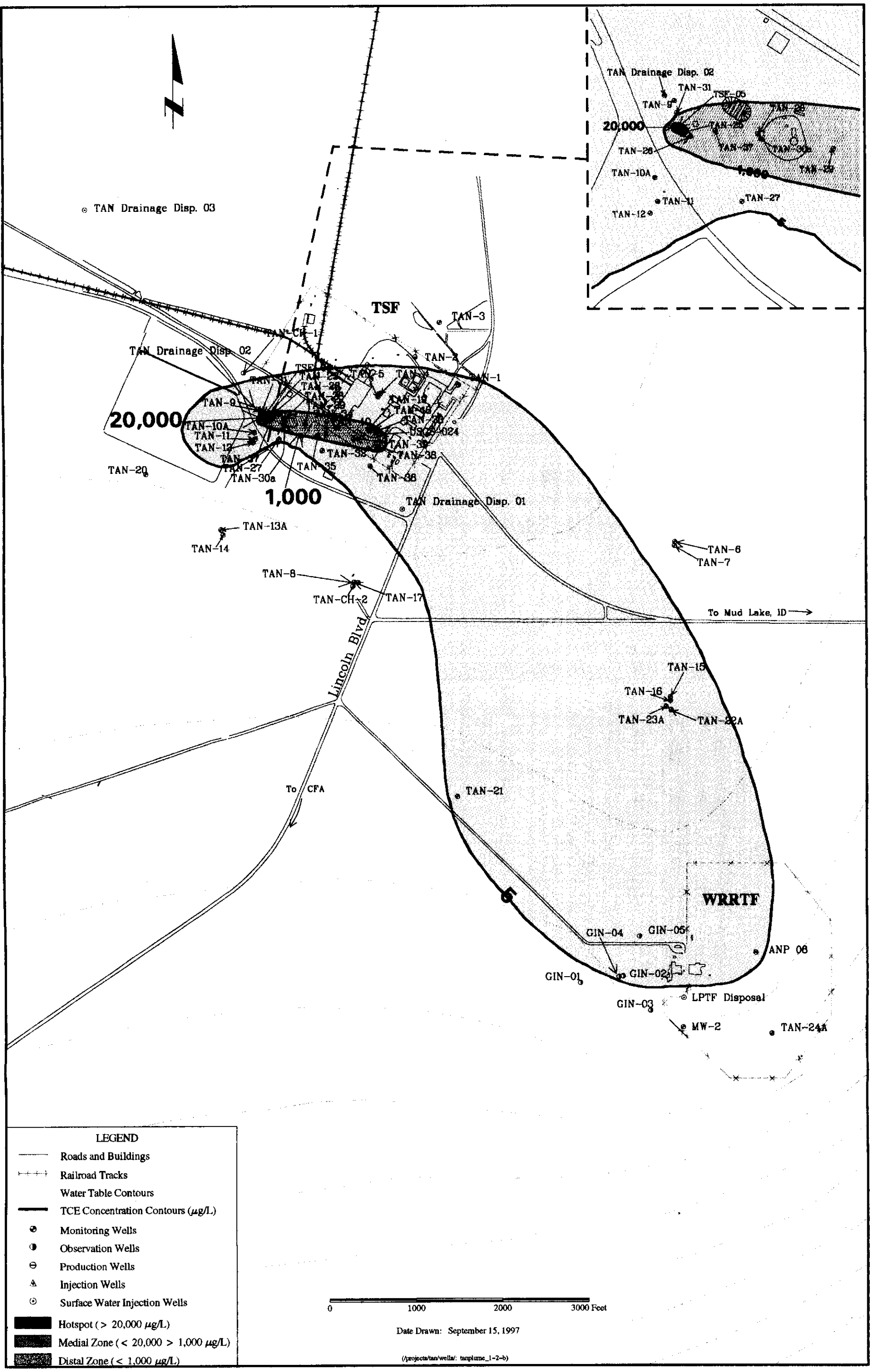

Figure 1-2. Iso-concentration map for TCE, which defines boundaries for the Hot Spot, Medial Zone, and Distal Zone.

Table 1-1. Validated results showing the range of contaminant concentrations.[ab]

Contaminant	TSF-05 Injection Well	TAN-25 Monitoring Well	TAN-26 Monitoring Well	MCL[c]
	Organic Compounds (mg/L)			
Tetrachloroethane (PCE)	14 - 440	4 - <1,000[d]	14 - 26	5
TCE	4,400 - 164,000	3,400 - 17,000	480 - 2,200	5
Cis-1,2-dichloroethene (DCE)	2,800 - 15,000	890 - 3,500	165 - 1,700	70
Trans-DCE	1300 - 13,000	450 - 2,000	16 - 63	100
	Radionuclides[e] (pCi/L)			
Strontium-90	530 - 16,800	370 - 476	0.8 - 4	8
Tritium	11,400 - 29,600	7,500 - 14,200	3,500 - 4,800	20,000
Uranium-234	1.0 E - 02 - 17	7 - 10	1.7 - 3.4	30
Uranium-235	6.43 E-04 - 1.7 E-01	--	--	30
Uranium-238	7.08 E-04 - 4.4 E-01	0.64	1.4	30
Americium-241/ Plutonium-238	8.83 E-02 - 2.19 E-01	3 E-02 < 0.2	7 E-02 < 0.2	15[f]
Plutonium-239/Plutonium-240	6.88 E-02 - 1.8 E-01	6 E-02 < 0.2	0.1 < 0.2	15[f]
Cesium-137	1,600 - 92,600	90 - 570	<30	119
Cobalt-60	8.72 - 7,430	<20	<20	100[g]

a) Values are from the OU 1-07B Remedial Investigation, OU 1-07A Final Progress Report for Batches one through 31, Phase 0 characterization, and OU 1-07B surge and stress, and groundwater monitoring through 10/96.
b) Key = -- not sampled; <(number) indicates less than the detection limit.
c) MCL = maximum contaminant level per Federal Drinking Water Standards. The MCL for U is for U-234, -235, and -238 series and is from a proposed rate dated July 18, 1991. The MCL for Cs-137 is derived from a corresponding 4 mrem /yr effective dose equivalent to the public, assuming lifetime in take of 2 L/day of water. These are proposed EPA MCLs from 1990.
d) Dilution factors of 1,000 and 200 were used during the March and June 1994 sample analysis, respectively. These dilution factors raised the detection limit for PCE to 1,000 mg/L for the March 1994 analysis, and 200 mg/L for the June 1994 analysis.
e) Uncertainties are not provided in the table, but are reported with the original data.
f) The MCL is for gross alpha particle activity (including radium-226, but excluding radon and uranium).
g) U.S. Environmental Protection Agency (EPA) (1977), Primary Drinking Water Standard.

2. ASSUMPTIONS

The following assumptions for RD/RA have been identified to provide a cost and schedule baseline for implementing the various RD/RA activities. These assumptions are based on the ROD base case pump and treat remedy as modified by the ESD, and correspond to the activities shown in the OU 1-07B RD/RA Logic Diagram, Figure 4-1. A key assumption in generating the logic sequence and schedule for the base case pump and treat operations is that treatability studies do not identify a technology that is more effective than the base case pump and treat remedy. Failure of treatability studies, in conjunction with a failure of surge and stress activities for source removal, will lead to a technical impracticability waiver and implementation of a hotspot containment strategy.

Sections 2-1 through 2-4 breakdown the RD/RA assumptions into four major areas: GWTF Operations, Treatability Studies, New Pump and Treat Facility (NPTF) Design and Construction, and the ROD base case.

2.1 Groundwater Treatment Facility Operations

This subsection describes the base operating parameters for the continued operation of the existing GWTF during treatability studies and during transition to New Groundwater Treatment Facility (NGWTF) operations.

2.1.1 Treatment and Discharge

The existing GWTF will operate with single pass treatment of groundwater to remove VOCs during Phase B implementation of hotspot containment. A radionuclide discharge standard will not be established or applied for groundwater treatment through the GWTF.

Treated water from the GWTF, which will have contaminant concentrations above MCLs during this interim period, will be reinjected at significantly reduced concentrations within the area between the hotspot and new extraction well locations approximately 2,000 feet downgradient of the TSF-05 injection well. The contaminant concentrations in reinjected water, although above MCLs, will always be below the contaminant concentration in the receiving groundwater, unless otherwise agreed to by the agencies.

The carbon adsorption air pollution control equipment in the GWTF will not be used unless necessary to meet air discharge standards due to higher VOC concentrations in the groundwater influent to the GWTF.

2.1.2 Surge and Stress

During surge and stress cycles, the GWTF will be operated in single pass mode (for both VOC and radionuclide treatment) with air pollution control (APC) equipment. The treated water will have contaminant concentrations above MCLs, but below those of the receiving waters, and will be reinjected upgradient of the extraction well.

The well casing for TSF-05 will maintain its integrity during dynamic surge activities.

2.1.3 GWTF Operations During Treatability Studies

During field implementation of treatability studies at the hotspot, operation of the GWTF may be reduced or discontinued if the field implementation is effective at providing hotspot containment, or if GWTF operations significantly interfere with data collection or implementation of the field study.

If after treatability studies are completed, in situ bioremediation (ISB) and in situ chemical oxidation (ISCO) are demonstrated to be less effective than the base case pump and treat remedy, a new pump and treat system will be designed and operated under single-pass groundwater treatment to reduce VOCs below MCLs as required to meet RAOs. The evaluation of treatability study results and final decision on the remedy for hotspot containment and/or removal will occur approximately 5 years after the ROD signature date.

2.2 Treatability Studies

The treatability studies will proceed as defined in the ROD and modified in the ESD. The major assumptions are captured below.

2.2.1 Approach

Treatability studies will continue by following a modified CERCLA treatability study approach that will provide data and information to determine if a technology is more effective than the pump and treat remedy selected in the ROD. The modified approach identifies three stages for conducting each of the five treatability studies; (1) Initial evaluations, (2) Laboratory investigations, and (3) Field evaluations. The process includes decision points for the Agencies at each stage. As this process progresses, fact sheets will be issued to keep interested parties informed whenever any significant results are obtained and decisions are made. This modified approach is described in the Technology Evaluation Work Plan and includes the results of the initial evaluations and provides subsequent planning for lab (bench) investigations and field (pilot) demonstrations, as appropriate for each of the five technologies.

2.2.2 Duration

The duration for conducting the treatability studies will be approximately 5 years from the date of ROD signature in order to facilitate a sequential approach for ISB and ISCO field evaluation in the hotspot. If ISB does not prove to be effective, the ISCO field evaluation will then be implemented in the hotspot. Implementation of field demonstration activities will follow appropriate laboratory investigations for both technologies.

Treatability study initial evaluations and the refined modeling suggest that Natural Attenuation (NA) may be effective for treatment of the 25 to 1,000 µg/L TCE plume and for augmenting treatment of the 1,000 to 20,000 µg/L dissolved phase TCE plume. Therefore, a field evaluation will be conducted to determine the effectiveness of NA.

2.2.3 Sequence

Treatability studies for ISCO will be planned to include a field evaluation, at a location just beyond the hotspot (greater than 20,000 µg/L TCE) boundary. This field evaluation will be designed to create a reactive zone to provide containment of the hotspot and will be implemented concurrently with the ISB field evaluation in the hotspot. If the ISB field demonstration indicates that ISB is not a viable

treatment technology for the hotspot, and ISCO was successful at creating a reactive zone, then the ISCO field evaluation will be implemented in the hotspot.

2.2.4 Early Procurement

The agencies agree that scheduling constraints make it necessary to allow for procurement of field evaluation infrastructure based upon the 90% design rather than waiting for the final approval of the alternate technologies Field Evaluation Work Plan.

2.3 New Pump and Treat Facility

This subsection describes the basic design, construction, and operation assumptions for the NPTF.

2.3.1 Early Phase C Implementation

As a result of negotiations under Dispute Resolution the agencies determined that immediate design, construction, and operation of a new pump and treat facility in the medial zone would facilitate long term restoration. The schedule agreed to during dispute resolution has design for this facility beginning in April 1998, with the RD/RA Work Plan due in April 1999 and operation beginning in March 2001.

2.3.2 Extraction Wells

Extraction wells for NPTF operations have been drilled and are located approximately 610 m (2,000 ft) downgradient of TSF-05. Available monitoring data indicate the NPTF influent TCE concentration will be approximately 1,000 µg/L. The NPTF will be designed to capture groundwater from this location and reduce VOC concentrations to below MCLs with single pass treatment. NPTF process flow rate will be less than 500 gpm and treated water will be reinjected into the aquifer.

2.3.3 Functional and Operational Requirements

The Functional and Operational Requirements (F&ORs) for the NPTF will be based on the results obtained from a extraction well, Well Characterization and Evaluation . The F&ORs will include process flow rate, design influent concentration, and reinjection method, along with other operational requirements. Based upon evaluations performed to date it is anticipated that the process flow rate will be less than 500 gpm.

2.4 ROD Base Case

The base case is the pump and treat remedy as described in the ROD and represents the activities necessary to meet the ROD RAOs. The base-case assumes that the results of treatability studies do not identify a technology that is more effective than the base-case pump and treat or that the Agencies do not reach consensus on an alternative to the base-case remedy. The elements of the base-case remedy, with corresponding assumptions, are identified in the following sections.

2.4.1 Groundwater Treatment Facility

Continuous operation of the GWTF may be curtailed during implementation of the treatability studies. The GWTF will be restarted after completion of the treatability studies as noted in 2.1.3 above. The GWTF will remain online until the NGWTF is operational.

2.4.2 Treatability Studies

Results of Treatability Studies will show that the specified technologies are not cost effective for removal of contaminants at the Hotspot, the Reactive Zone, the Medial Zone or this Distal Zone. Results of these studies will be documented in the Phase II Treatability Study Field Demonstration Report Phase II (FDR).

2.4.3 Technical Impracticability Waiver

Upon completion of the final Phase II Treatability Study FDR and the failure of alternate technologies to be more effective than the base case pump and treat remedy and the failure of surge and stress for source removal, a Technical Impracticability Waiver (TIW) will be obtained and a hotspot containment strategy will be implemented.

2.4.4 New Pump and Treat Facility for the Medial Zone

Upon completion of the Well Characterization Evaluation (WCE) activities a RD/RAWP will be prepared for the installation of a NPTF in support of early implementation of Phase C extraction and treatment of the medial zone of the dissolved phase plume.

2.4.5 New Groundwater Treatment Facility

Upon completion of the Phase II FDR a revised RD/RAWP will be prepared for installation of a NGWTF to establish source containment at the hotspot.

2.4.6 Dissolved Phase Treatment Units for the Distal Zone

Upon completion of the Phase II FDR a revised RD/RAWP will be prepared for the installation of Dissolved Phase Treatment Units (DPTU) for extraction and treatment of the Distal Zone.

3. UNRESOLVED ISSUES

Unresolved issues are defined to help identify the risks associated with the project which could affect schedule and budget.

The primary uncertainty associated with the project is the ongoing data gathering activities during RD/RA. RD/RA activities are dependent upon continuing characterization and evaluation efforts of plume dynamics and aquifer parameters. The ROD identified a sequence of activities with key decision points for the Agencies as shown in Figure 3-1. The decision points are defined in the ROD as follows:

Decision Point a) At the completion of Phase A radionuclide removal testing, a decision will establish radionuclide discharge limits for reinjection of process effluent.

Decision Point b) Evaluate surge and stress 15 months after the ROD signature to determine if secondary source removal is effective. If it effective, surge and stress will continue, otherwise it will be discontinued.

Decision Point c) The treatability study bench scale results will be evaluated and a decision made to select technologies for the pilot scale studies.

Decision Point d) Evaluate the effectiveness of source removal.

Decision Point e) The treatability study pilot scale results will be evaluated against the default pump and treat. A decision will be made on the most effective final RA process.

Decision Point f) Implementation of the default pump and treat will result if the alternate remedies do not demonstrate greater effectiveness.

Evaluation criteria specific to each decision will be established during the preparation of RD/RA deliverables, as identified in Section 4. Table 3-1 contains OU 1-07B Decision Point dates which correspond with Figure 3-1. –

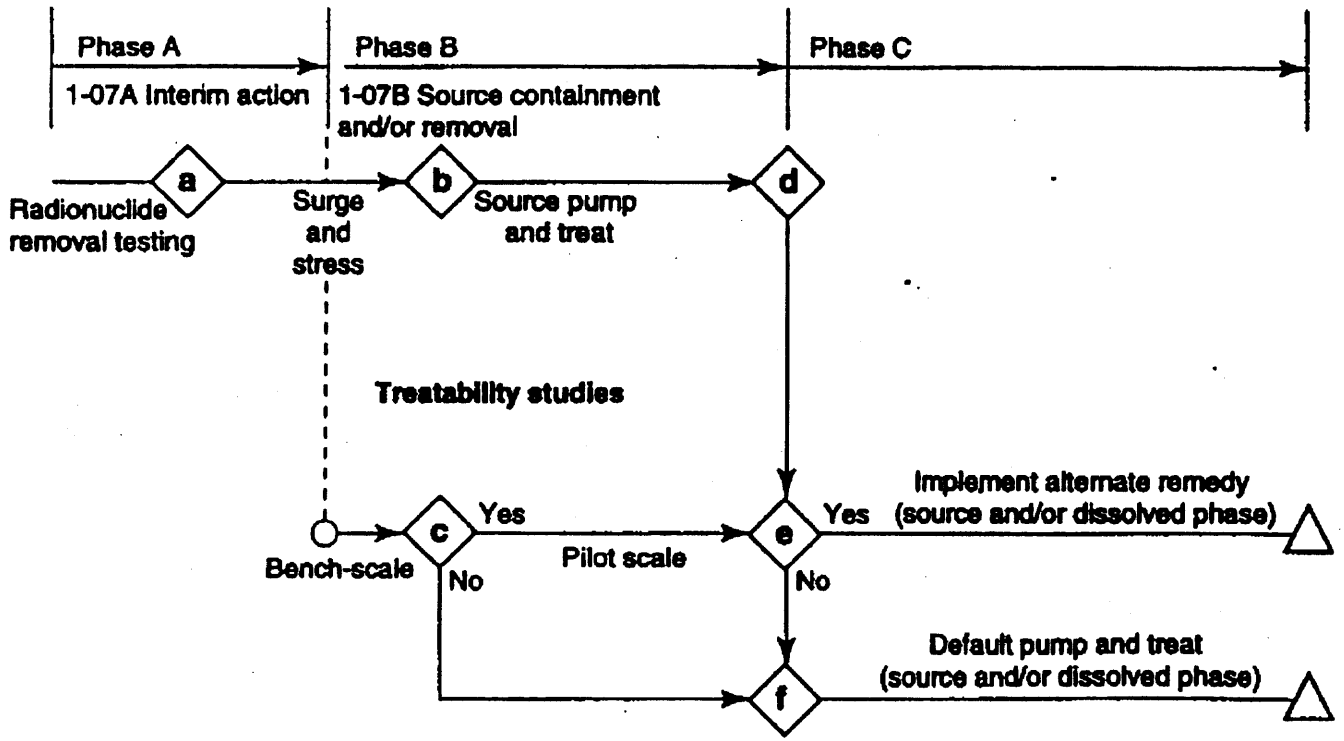

Figure 3-1. OU 1-07B ROD TAN final groundwater remediation decision logic.

Table 3-1. OU 1-07B decision points.

	ROD Decision Point/Decision Document	Decision Date
a)	Radionuclide Removal Decision (1)	03/01/96 (A)
b)	Surge and Stress Effectiveness Decision (15 month)/ Surge and Stress Evaluation Report	01/24/97(A)
c)	Pilot Scale Technologies Decision/Bench Scale Report	(2)
d)	Source Containment and/or Removal Effectiveness Decision (3)	(3)
e)	Alternate Remedy Decision/Field Demonstration Report (4)	06/06/01
f)	Implement Default Phase C Pump and Treat/Field Demonstration Report (3)	06/06/01

(A) Actual Date

(1) Based on radionuclide removal testing results, radionuclide removal technology, as applicable to the existing GWTF, was determined to be cost prohibitive within the hotspot. For extraction and treatment of groundwater outside of the hotspot, radionuclide removal was determined unnecessary due to very low or non-detectable levels of radionuclides in the groundwater.

(2) Dates for decisions on selecting technologies for pilot scale evaluations will be planned separately for each technology.

(3) a. Source Removal/Second Surge and Stress Report January 30, 1998
b. Containment/Phase II Field Demonstration Report 06/06/01.

(4) This report is referred to in the 1-07B ROD as the Treatability Study Report.

4. APPROACH AND DELIVERABLES

4.1 Approach

The OU 1-07B ROD, signed in August 1995, established a selected remedy to be conducted in three phases: Phase A - Transition of OU 1-07A Interim Action to OU 1-07B Final Remedial Action; Phase B - Hotspot Containment and/or Removal with Treatability Studies; and Phase C - Dissolved Phase Groundwater Treatment with Continuation of Hotspot Containment and/or Removal.

The plume area definition shown on (Figure 1-2), is as revised by the ESD. The new information provides the opportunity to improve the focus of the remediation efforts by refining the ROD hotspot and dissolved plume definitions. The refined area definitions are:

- Hotspot (greater than 20,000 µg/L TCE)
- Medial Zone (dissolved phase 1,000 µg/L to 20,000 µg/L TCE)
- Distal Zone (dissolved phase 25 µg/L to 1,000 µg/L TCE)[1]

The approach for implementation of Phase A, B, and C, as described in the ROD and as modified by the ESD is provided in the following sections. Phases B and C of this RD/RA will follow the project logic, as shown in Figure 4-1, OU 1-07B RD/RA Logic Diagram (developed during the April 7, 1997 agency conference call), and as modified in subsequent calls and meetings.

The ROD defines Phase A as the transition to OU 1-07B activities through the continuation of OU 1-07A surge and stress pumping of the TSF-05 injection well and operation of the interim action GWTF to remove secondary material, pump and treat contaminated groundwater, and collect data on aquifer parameters. The Phase A transition period, which also included testing of radionuclide removal technologies, has been completed and marks the end of the OU 1-07B Interim Action.

The ROD, as modified by the ESD, establishes Phase B as the time frame during which the following activities will be conducted:

- Continuation of hotspot containment and/or removal as an enhancement of the OU 1-07A interim action at a rate sufficient to create hydraulic containment of TCE and other contaminants within the hotspot (greater than 20,000 µg/l TCE plume) to the extent practicable.
- Continuation of TSF-05 injection well surge and stress activities.
- Continuation of treatability studies following a modified CERCLA treatability study approach. The modified approach identifies three stages for conducting each of the five treatability studies: (1) Initial Evaluations (2) Laboratory Investigations, and (3) Field Evaluations.

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[1] In accordance with the ROD Natural Attenuation is effective for 25 µg/L and below.

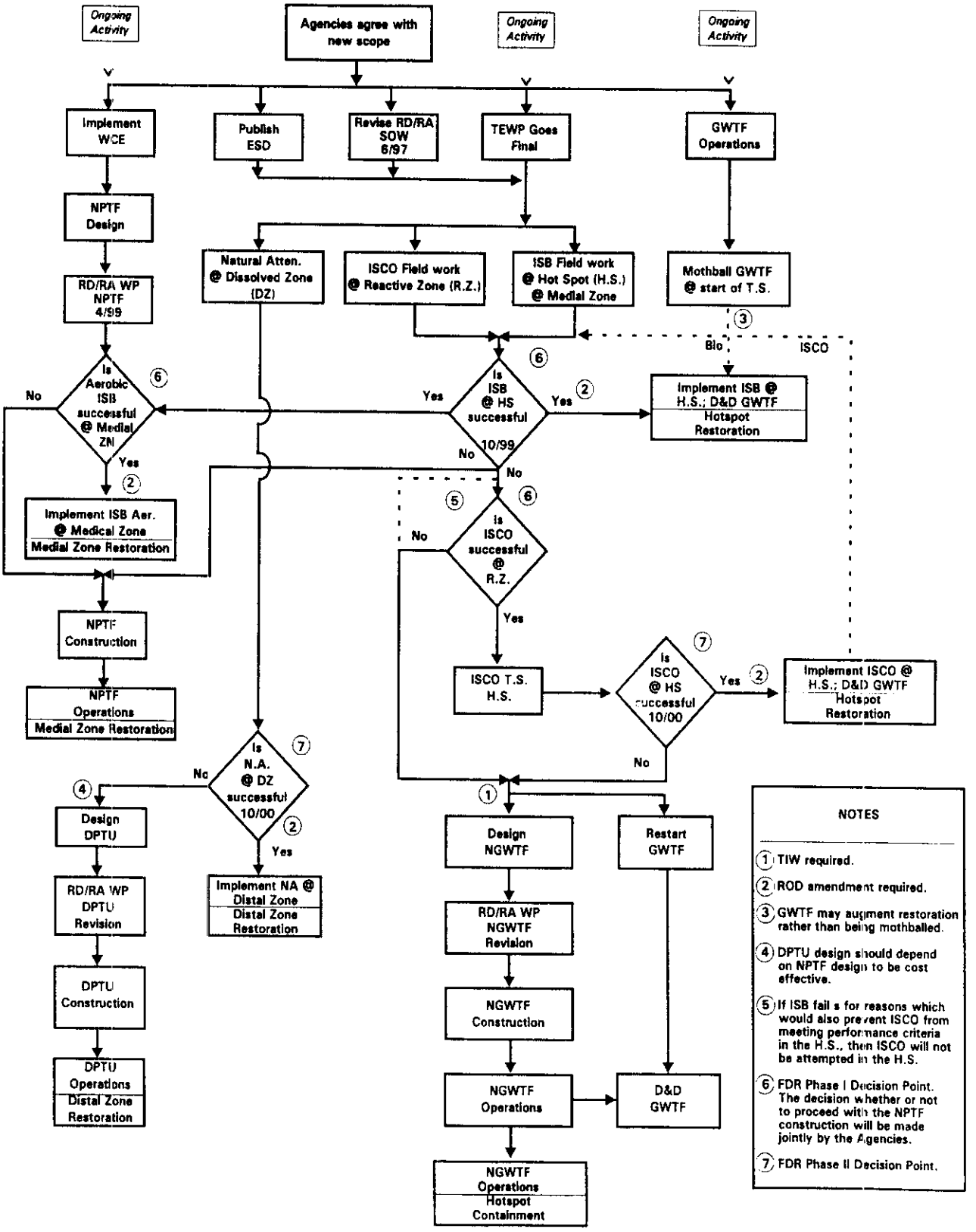

Figure 4-1. OU 1-07B logic diagram (developed during the April 7, 1997 Agency conference call).

- Groundwater monitoring to track the greater than 5 µg/L TCE plume, document TCE concentrations over time, provide information on the attenuation rate of the plume and evaluate attainment of remedial action objectives.

The ROD, as modified by the ESD, defines Phase C as the time frame during which the final remedy will be implemented. Phase C follows the completion of Phase B treatability studies and includes continuation of groundwater monitoring and hotspot containment and/or removal initiated in Phase B. If during Phase B an alternate technology is found to be more effective than the continued long term pump and treat, the agencies will modify the ROD as appropriate and initiate design of the alternate remedy.

4.1.1 Phase A - Transition of OU 1-07A Interim Action to OU 1-07B Final Remedial Action

Phase A consisted of activities needed to transition operations associated with the GWTF from the OU 1-07A Interim Action to the OU 1-07B Final Action. Certain activities needed for this transition were identified in the OU 1-07B ROD and primarily consist of the following:

- Resume pumping from the vicinity of TSF-05, treating the water and discharging the water to a reinjection well near TSF-05.

- Complete radionuclide removal testing and GWTF modifications needed to support treatment of the water obtained during surge and stress activities and for radionuclide removal. Results of radionuclide removal testing indicated that implementation of radionuclide treatment is impracticable.

- Initiate surge and stress activities at TSF-05 in efforts to remove source contaminants from the well and surrounding vicinity.

4.1.2 Phase B - Hotspot Restoration, Containment and/or Removal

Phase B is being conducted during two distinct periods of time: (1) from August 1995 to September 1998 Phase B activities will focus on hydraulic containment and source removal via surge and stress activities utilizing the GWTF, and (2) from October 1998 to November 2000 Phase B will focus on further laboratory investigation and field evaluation of ISB at the hotspot and ISCO in a reactive zone and at the hotspot. If technology proves successful, then that technology will be implemented as the final remedy for the hotspot during Phase C. The failure of treatability study technologies to be more effective than base case pump and treat remedy, and the failure of surge and stress for source removal will result in application for a TIW and implementation of a hotspot containment strategy.

4.1.2.1 Surge and Stress Activities. Surge and stress will continue for secondary source removal, to characterize the source area, and to provide data to evaluate restoration or containment of the hotspot.[2] Surge and stress activities may be discontinued if data show that the activities are ineffective. During surge and stress cycles, the GWTF will be operated in single pass mode for both VOC and radionuclide treatment. APC equipment will be utilized for the effluent air stream. The treated water will be reinjected upgradient of the extraction well.

Based upon the information contained in the February 1997 *Well TSF-05 Surge and Stress Evaluation Report for Operable Unit 1-07B* Revision 2, the agencies have agreed that surge and stress activities have been effective at meeting some of the objectives of the Surge and Stress Plan, and that surge and stress activities should continue. This agreement constitutes agency decision for ROD Decision Point b. Based on the agencies decision to continue surge and stress, the following activities will be implemented:

- Sludge samples from TSF-05 will be collected and analyzed. Sludge removal will be conducted to the extent determined by the Agencies.

- Mechanical surge and stress will be performed as described in the Surge and Stress Plan for OU 1-07B.

- A second Surge and Stress Report will be prepared to provide the results of the air lift surge and stress and the mechanical surge and stress and provide a basis for an agency decision to discontinue further surge and stress activities.

[2] APC will be used during single pass treatment operations.

4.1.2.2 Groundwater Treatment Facility Operations. The existing GWTF will operate with single pass groundwater treatment to remove VOCs during the first 4 to 5 years of Phase B implementation of hotspot containment. A radionuclide discharge standard will not be established and radionuclide treatment is not expected to occur during this phase of the project. The treated water, which will have contaminant concentrations above MCLs during this interim period, will be reinjected within the area between the hotspot and the new extraction well locations approximately 610 m (2,000 ft) downgradient of the TSF-05 injection well. Reinjected water, although above MCLs, will always be below the COC concentration in the receiving groundwater. During field implementation of Treatability Studies at the hotspot, operation of the GWTF may be curtailed as required so that GWTF operations do not interfere with data collection or implementation of the field study. It may be determined during preparation of the Field Evaluation Work Plans that the GWTF can be used to augment field implementation of a Treatability Study Technology.

4.1.2.3 Treatability Studies. Treatability Studies will continue by following a modified CERCLA treatability study approach that will provide data and information to determine if a technology is more effective then the pump and treat remedy selected in the ROD. The modified approach identifies three stages for conducting each of the five treatability studies: 1) Initial Evaluations, 2) Laboratory Investigations, and 3) Field Evaluations. The process includes decision points for the Agencies at each stage. As this process progresses, fact sheets will be issued to keep interested parties informed whenever any significant results are obtained and decisions are made. This modified approach is included in a Technology Evaluation Work Plan that includes the results of the initial evaluations and provides subsequent planning for lab (bench) investigations and field (pilot) evaluations, as appropriate for each of the five technologies.

The duration for conducting the treatability studies will be extended to approximately 5 years from the date of ROD signature in order to facilitate a sequential approach for ISB and ISCO field evaluations in the hotspot. If ISB does not prove to be effective (in terms of restoration time frame or cost) for restoration of the hotspot, the ISCO field evaluation will be implemented in the hotspot.

Treatability study initial evaluations for ISB and ISCO indicate that both have the potential for restoration of the hotspot in a shorter time frame than the default pump and treat technology and that NA has the potential for restoration of the distal zone within the restoration time frame. Implementation of ISB and the ISCO field evaluation activities will follow appropriate laboratory investigations. The NA field evaluation will be based on data collected during routine plume monitoring and will not include laboratory investigations.

Treatability studies for ISB will focus on hotspot restoration and will be planned to include laboratory investigations to characterize indigenous microcosms, hydrolgeological investigations to characterize aquifer properties in the vicinity of hotspot, and a field evaluation of a nutrient amended recirculation cell within the anaerobic zone surrounding the hotspot. The anaerobic ISB recirculation cell will be planned to operate without interference from, and concurrent with, the ISCO reactive zone described below.

Treatability studies for ISCO will be planned to include a field evaluation at a location not greater than 500 feet down gradient from the TSF-05 injection well. This field evaluation will be planned for concurrent implementation with the anaerobic ISB hotspot field evaluation and will be designed to create a chemically reactive zone that may contain the hotspot. Prior to implementing ISCO field evaluation activities, laboratory investigations will be performed to determine and confirm objectives and optimal location of the reactive zone field evaluation. If the anaerobic ISB hotspot field evaluation indicates that bioremediation is not a viable treatment technology for hotspot restoration, then an ISCO field evaluation will be implemented in the hotspot.

The medial zone aerobic recirculation cell concept will only be evaluated as a component of the ISB laboratory studies and through data collected during routine plume monitoring. In the event that a field evaluation of ISCO shows that it is not cost effective or long-term implementation exceeds the ROD defined restoration time frame, and if anaerobic ISB in the hot spot is effective (in terms of restoration time frame or cost), then a medial zone aerobic recirculation cell may be further evaluated as a component of the NPTF that would support a combined anaerobic/aerobic treatment system.

ISB and ISCO will be evaluated through laboratory studies which will be followed by the development of a Field Evaluation Work Plan (FEWP) for each of the technologies. The FEWP will recommend and detail activities for field implementation and include the final infrastructure design for the technology. The FEWP will be preceded by a 30% and a 90% design of the infrastructure for the field evaluation.

The field evaluation of the treatability studies will be conducted in two phases, Phase I implements ISB at the hotspot, ISCO at the reactive zone while NA monitoring continues at the distal zone. At the conclusion of Phase I, a Phase I FDR will be prepared. This report will detail the success or failure of ISB and ISCO Phase I Field Evaluation and make a recommendation regarding proceeding with Phase II. Phase II will occur if ISB fails at the hotspot and ISCO lab studies or reactive zone evaluation succeeds. Phase II implements ISCO at the hotspot and continues NA monitoring at the distal zone. If Phase II is completed, a Phase II FDR will be prepared. This report will make a recommendation relative to implementing ISCO as the final remediation technology for the hotspot and NA as the final remedy for the Distal Zone.

Implementation of an alternate technology will require a ROD amendment. The amendment will be prepared and submitted based on the Phase I or Phase II FDR. If at any point it is shown that restoration of the hotspot is not possible by any alternate technology, a TIW will be written to change the remediation objective to hotspot containment which will require design, construction, and operation of a NGWTF.

A field evaluation will be conducted to determine the applicability of NA as an alternative technology for remediation of the distal zone. The existing monitoring system will be augmented with several new wells located in the Distal Zone. Sampling data will be gathered from all monitoring wells to establish base-line contaminant concentrations within the plume. A monitoring program will be established for succeeding years to measure the performance of NA against the baseline. The information gathered from these activities will be reported in the Phase I FDR and Phase II FDR and a decision made as to what extent NA can be implemented as a final remediation measure. If, at any point, it is shown that NA is not effective, dissolved phase treatment units will be pursued.

4.1.3 Phase C - Dissolved Phase Groundwater Treatment with Continuation of Hotspot Containment and/or Removal

Early implementation of Phase C will be to design, construct, and operate a new treatment system with extraction wells located approximately 610 m (2,000 ft) downgradient from the TSF-05 injection well. The purpose of the NPTF will be to capture and treat groundwater between the hotspot containment zone and the 1,000 μg/L isopleth. The new facility is expected to operate at less than 500 gpm. Based on monitoring data collected at the new extraction location, influent radionuclide concentrations are anticipated to be below MCLs and thus will require no radionuclide removal treatment. The decision to exercise additional Phase C treatment options will follow the completion of Treatability Studies.

4.1.3.1 New Pump and Treat Facility. The early implementation of Phase C will be accomplished by installing and operating the NPTF as detailed above. The design and construction of the NPTF will be preceded by the WCE testing conducted during the summer of 1997. The evaluation will be conducted on the planned NPTF extraction wells and the information gathered will be used to develop the F&ORs for the design of the NPTF, including design flow rate and influent concentration.

4.1.3.2 New Ground Water Treatment Facility. Should alternative technology evaluations fail at the hotspot then a NGWTF will be designed and constructed at the hotspot. The purpose of the facility will be to provide containment of the hotspot. This containment system plus the Phase C dissolved plume cleanup systems will support the long term OU 1-07B remediation goals.

4.1.3.3 Dissolved Phase Treatment Units. Should NA prove to be inadequate for restoration of the distal zone within the 100 years Restoration time frame RAO, then a pump and treat unit will be designed and constructed to meet long-term remediation goals for the Distal Zone.

4.2 Remedial Design and Remedial Action Deliverables

This section discusses the remedial design and remedial action deliverables which will detail and document various phases and activities of this RD/RA. These deliverables will be submitted to the agencies for review and approval in accordance with the schedule provided in Section 5 of this document.

Program continuity and overall administration and management of this RA will be enhanced through development of a single RD/RA WP for both Phase B and Phase C remedial activities. As shown in the OU 1-07B Deliverable Log, Table 5-1, the RD/RAWP will be revised as appropriate for each Phase B and Phase C RA component as defined in this section. Each RD/RAWP revision will be submitted as a primary document to ensure Agency review, comment incorporation, and concurrence.

4.2.1 Phase A Remedial Design and Remedial Action Deliverables

Phase A activities which established deliverables are detailed below.

4.2.1.1 Phase A Remedial Design Deliverables. The RD deliverables were established in the Final Sampling, Analysis, and Test Plan for TAN Phase 0 Activities, OU 1-07B. Deliverables included the TSF-05 well sampling and sample characterization results, the GWTF Laboratory Verification Report, and results of the laboratory testing for radionuclide removal techniques.

The TSF-05 well characterization data was complete in June of 1995. The Laboratory Verification Report was completed in September of 1995. The laboratory testing of radionuclide removal techniques was completed in late 1995; however, the results were never formalized in a final document. It was determined, based on the data obtained during these laboratory tests, that the tested methods of radionuclide removal would be cost prohibitive if used in the existing GWTF. Therefore, the only radionuclide removal operations used in the GWTF consists of the radionuclides removed with the solids in the water.

4.2.1.2 Phase A Remedial Action Deliverables. There were no specific RA deliverables identified for Phase A; however, RAs were to begin and become operational as outlined in the Final Sampling, Analysis, and Test Plan for TAN Phase 0 Activities, OU 1-07B. These actions are as follows:

- Complete GWTF modifications for radionuclide removal and solids removal
- Begin operation of the GWTF with routine process monitoring and data acquisition
- Establish a performance evaluation system for GWTF analytical laboratory
- Initiate surge and stress activities in TSF-05.

Each of these items have been completed or are currently on-going. The GWTF modifications consisted of installation of an in-line hydrocyclone and additional bag filters. These modifications were completed in February of 1996. Routine operations, process monitoring, and laboratory performance evaluation began in September, 1995 and are documented in the GWTF monthly reports. TSF-05 well stressing, by over pumping TSF-05, was initiated in December of 1995.

4.2.2 Phase B Remedial Design/Remedial Action Deliverables

Phase B activities with established primary and secondary deliverables are ISB, NA, ISCO Treatability Studies, and surge and stress evaluations.

4.2.2.1 Surge and Stress Evaluation Reports. A secondary document was prepared to evaluate surge and stress activities through July 1996. The document provided a summary and an evaluation of data collected during surge and stress operations for the first year. Draft and final documents were submitted. The final document incorporated resolutions to comments on the draft. The evaluation report recommends that the objectives of the surge and stress activities be focused on mechanical surging of TSF-05 to maximize the contaminant removal. Surge and stress activities to date (i.e., overpumping) have not been effective at removing significant volumes of secondary source material.

A second Surge and Stress Report will be prepared as a secondary document to provide the results of the air lift surge and stress and the mechanical surge and stress and provide a basis for an agency decision to discontinue further surge and stress activities. A draft and final report will be submitted.

4.2.2.2 Treatability Study Bench Scale Work Plan. The work plan summarizing initial evaluations of the five alternative technologies defined in the OU 1-07B ROD was an expedited primary document. The draft and final Technology Evaluation Work Plan (TEWP) was submitted December 15, 1996.

The TEWP summarizes the Treatability Study initial evaluations of the five technologies being considered for use at TAN and provides an overview of work plans for those technologies recommended to proceed to stage 1 or 2. As stated earlier, hereafter stage 1 will be referred to as a laboratory study and stage 2 will be referred to as field evaluation. The alternative technologies are being evaluated using the CERCLA Treatability Study process modified to produce only the information needed to evaluate and implement the technologies. The TEWP includes a technology description, results of initial evaluations with information gathered to date, and an overview of additional planned laboratory studies and field evaluations. Resolutions to agency comments made on the draft submittal were incorporated into the final TEWP. A draft final report was not prepared or submitted for review and comment.

4.2.2.3 Treatability Study Pilot Scale Work Plan. The technology evaluation process was designed by the agencies to provide a decision process to facilitate early screening of technologies with a focus on performance improvement and cost savings over the base case. The evaluation process included incorporation of the "Pilot Scale Work Plan" primary deliverable into the TEWP described above. Thus the enforceable milestone for delivery of the "Pilot Scale Work Plan" has been met with the December 15, 1996 submittal of the TEWP. As the agencies make a decision for a specific technology to proceed to field evaluations, a Field Evaluation Work Plan (FEWP) will be prepared as described in Section 4.2.2.6.

4.2.2.4 Alternate Technology Field Evaluation Thirty Percent Design. A 30% design for the alternate technology infrastructure will be prepared for agency review. It will include layout drawings, preliminary specifications, process flow diagrams, piping and instrumentation diagrams, design criteria, and major components list.

The 30% design package will be a secondary document with a 30-day agency-review period and a 30-day comment-resolution period. Any modifications to the design, brought about as a result of agency comments, will be incorporated into the 90% design.

4.2.2.5 Alternate Technology Field Evaluation Ninety Percent Design. A 90% design will be prepared for agency review. The 90% review will incorporate the 30% design agency comment resolutions. The agencies agree that due to time constraints procurement and construction of the alternate technology infrastructure systems will be based upon the 90% design. The 90% design will include construction drawings, process drawings, equipment specifications and any other elements determined from the 30% design.

The final design, including resolution to agencies 90% design comment will be included in the FEWP.

4.2.2.6 Field Evaluation Work Plan. A FEWP will be prepared and submitted to the agencies for review and approval. The FEWP will be a compilation of the laboratory studies data, and will recommend and detail activities for field implementation of the alternative technology. The draft FEWP will include the final alternate technology infrastructure design.

A separate FEWP will be prepared for each alternate technology slated for field evaluation; ISB, ISCO, and NA. The FEWP will make a recommendation and provide a description of activities for the implementation of the given technology in the field, and will include planning and coordination of field activities between the three technologies. The work plan will be prepared following the laboratory studies for the respective alternate technology and will be based in part upon data analysis and evaluation of the laboratory studies. Should the data indicate a recommendation not to employ the given alternate technology in the field, the work plan will become a Treatability Study Technology Report detailing the technology's inability to offer performance improvements and cost savings.

4.2.2.7 Phase I Field Demonstration Report. A Phase I FDR will be prepared and submitted to the agencies for review and approval. The FDR is a primary document and will be subject to the standard primary document review and comment resolution time periods.

The Phase I FDR will document the success or failure of ISCO at the reactive zone and anaerobic ISB at the hotspot and laboratory investigation results of potential aerobic degradation applicable to remediation of the medial zone. The Phase I FDR will make a recommendation regarding proceeding with Phase II.

4.2.2.8 Phase II Field Demonstration Report. The Phase II FDR will be prepared and submitted to the agencies for review and approval. The Phase II FDR will be a primary document and will be subject to the standard primary document review and comment resolution time periods.

The Phase II FDR will document the success or failure of ISCO as an alternate technology for hotspot restoration and NA for distal zone remediation. Should ISCO fail, a NGWTF will be designed, constructed, and operated at the hotspot. Should NA fail, DPTUs will be designed, constructed, and operated in the distal zone.

4.2.3 Phase C Base Case Remedial Design/Remedial Action Deliverables

Phase C RD/RA deliverables are dependent upon the outcome of treatability studies and decisions made during Phase B. Phase C will, however, implement one or a combination of several of the following RAs components:

- NPTF for the medial zone
- NGWTF to contain the hotspot
- DPTUs for the distal zone.

4.2.3.1 NPTF Deliverables. Currently NPTF planning and design are the only scheduled RD/RA activities leading to a enforceable milestone for a RD/RA Work Plan. The following sections list and detail various documents leading up to and following the RD/RA Work Plan.

1. **NPTF Technology Evaluation.** As part of the preliminary design process, a technology evaluation was prepared comparing commercially available technologies being considered

for the project. This technology evaluation will be discussed with the agencies prior to proceeding with the design effort.

2. **Well Characterization and Evaluation.** In order to support the development of the F&ORs for the design of the NPTF a WCE was conducted during the summer of 1997. This WCE evaluated the hydraulic characteristics of the five wells which were selected by the Agencies during the summer of 1996 and which are to be used for groundwater extraction approximately 2000 ft downgradient from TSF-05. These well locations were selected based upon consensus developed among the project management team and the extrapolation of modeling of the TAN hotspot to the leading edge of the 1,000 μg/L isopleth.

   The WCE test plan outlined a series of field tests needed to determine hydraulic properties of the subsurface, to collect data to determine the influent concentration for design of the NPTF, and to evaluate the appropriate placement of reinjection wells. The WCE used an integrated approach including geophysics, pumping tests, tracer tests, depth discrete sampling, and other methods to characterize the subsurface at the extraction well field. Information collected during WCE is providing a basis for NPTF design; however, additional well testing and modeling may be required after construction of the NPTF to optimize the pumping rates and specific depth intervals during operations from individual wells in order to achieve the most cost effective pumping scenario in terms of both capital and operational costs. These tests may include variations in the flow rate from individual wells, pulse-pumping, or tracer tests.

   The WCE test plan was a secondary document with a 12-day expedited agency-review period and a 12-day comment-resolution/finalization period.

3. **NPTF Functional and Operational Requirements (F&OR).** Using the results of the WCE activities, design parameters for the NPTF will be determined. These parameters along with other significant operational requirements will be compiled into a F&OR document. This document is not identified as a primary deliverable, however it will be submitted to the agencies with the usual 45 day review period associated with primary documents. The information included in the F&ORs will be used to proceed with the 30% design of the NPTF.

4. **NPTF Life Cycle Cost Analysis (LLC).** A LCC analysis will be performed using the technology evaluation and the design parameters included in the F&ORs. This LCC analysis will be submitted to the agencies for review and comment. A technology will be selected as a result of this LCC analysis, and carried forward into the 30% design. The agencies will have a 30-day review period followed by a 30-day comment-resolution period. The decision on which technology to use will be a result of the comment resolution.

5. **NPTF Thirty Percent Design.** A 30% design for the treatment facility, groundwater collection system, extraction and reinjection wells, and site preparation and utilities will be prepared for agency review. It will include layout drawings, preliminary specifications, process flow diagrams, piping and instrumentation diagrams, design criteria, and major components list.

   The 30% design package will be a secondary document with a 30-day agency-review period and a 30-day comment-resolution period. Any modifications to the design, brought about as a result of agency comments, will be incorporated into the 90% design.

6. **NPTF Ninety Percent Design.** A 90% design will be prepared for incorporation into the NPTF RD/RAWP. The 90% design will include construction drawings, process drawings, equipment specifications, and any other elements determined from the 30% design. The 90% design will be included as part of the RD/RA WP.

7. **NPTF RD/RAWP.** The RD/RAWP will be submitted as a primary document, with a draft and final submittal. This document is subject to the usual 45 day agency review. The RD/RAWP will include the following as necessary:

   - Design criteria, plans and specifications, system drawings, and equipment descriptions
   - Description of how the RA will meet applicable or relevant and appropriate requirements (ARAR)
   - RA cost estimate
   - RA schedule
   - Sampling and Analysis Plan, including a Quality Assurance Project Plan
   - Health and Safety Plan
   - O&M Plan
   - Waste Management Plan/Waste Minimization Plan
   - D&D Plan, where applicable
   - Identification of any relevant changes to the RD/RA SOW
   - Identification of additional RA documents and inspections
   - Identification of protocol and coordination of field oversight and inspections
   - NPTF compliance monitoring requirements - treatment performance and remedial progress
   - NPTF institutional control requirements
   - Evaluation criteria for determining effectiveness

   Consensus will be reached on elements of the RD/RAWP during conference calls, design review meetings, and prior to submittal of the RD/RAWP.

   The final document will incorporate and respond to agency comments on the draft RD/RAWP.

8. **NPTF Prefinal Inspection Report.** The prefinal inspection will be conducted by the Project Managers, or their designees, prior to shakedown testing of the system. The DOE-

ID will prepare the Prefinal Inspection Report and respond to comments received on the report. The Prefinal Inspection Report will be secondary document and the results will be reported in the RA Report. The submittal schedule for the Prefinal Inspection Report will be set in the RD/RAWP.

The Prefinal Inspection Report will be a secondary document that will include the following:

- Inspection checklist
- Discussion of findings
- Outstanding RA requirements
- Corrective action plans
- O&M Plan update, if necessary
- Final inspection date.

9. **NPTF Final Inspection Report.** For earlier components of the remedy a final inspection report for each of the components will be prepared and submitted. Each of the earlier final inspection reports will be updated as necessary and incorporated into the final RA Report. A single RA report will be prepared for OU 1-07B after all components of the remedy have been implemented and are operational. The RA Report is covered further in subsection 4.2.3.2. The submittal schedule for the RD/RA Final Inspection will be set in the RD/RAWP.

4.2.3.2 Other Phase C Deliverables. Other Phase C deliverables are for treatability study technologies, and/or NGWTF and DPTUs and will consist of the following:

1. **Phase C Preliminary Design.** A preliminary design will be prepared for both the NGWTF and DPTUs and will be a 30% preliminary design. If the timing is right, several actions may be combined into one Preliminary Design. It will be submitted as a secondary document, and then will be incorporated into the subsequent primary document, the draft revision of the RD/RAWP. The purpose of this document is to provide the agencies with early design information and allow for early identification and resolution of design issues. A design scoping meeting may be held in conjunction with the preparation or submittal of the Preliminary Design. The contents of the Preliminary Design include:

   - Summary of revisions to the RD/RAWP
   - General arrangements drawings
   - Major equipment identification
   - Identification of unresolved data needs
   - Preliminary specifications

- Process flow diagrams
- Operating and control philosophy.

2. **Phase C RD/RAWP.** As described at the beginning of Section 4.2, the RD/RAWP for the NPTF will be revised to incorporate subsequent remedy components. This primary document revision will include draft, draft final, and final submittals. There may be one or several revisions of this document depending on the timing of implementation of NGWTF and DPTUs. This document is subject to the usual 45 day agency review. The contents of this revised RD/RAWP will include:

   - Comment resolution from the Preliminary Design
   - Plans and specifications for RA, including drawings
   - Design criteria and procedures for RA including requirements for personnel, equipment, and construction materials
   - Description of how the RA will meet ARARs
   - RA cost estimate
   - RA schedule
   - Health And Safety Plan
   - Sampling and Analysis Plan
   - O&M Plan
   - Emergency procedures
   - Waste Management Plan/Waste Minimization Plan
   - D&D Plan, where applicable
   - Identification of any relevant changes to the RD/RA SOW
   - Identification of additional RA documents and inspections
   - Identification of protocol and coordination of field oversight and inspections
   - Phase C monitoring requirements
   - Phase C institutional control requirements
   - Evaluation criteria for use in determining effectiveness.

The draft final and final documents will incorporate and respond to comments on the draft and draft final, respectively.

3. **Prefinal Inspection Report.** The prefinal inspection will be conducted by the Project Managers, or their designees, prior to shakedown testing of the system. The DOE-ID will prepare the Prefinal Inspection Report and respond to comments received on the report. The Prefinal Inspection Report will be finalized in the context of the RA Report. The milestone date for this document will be established in the RD/RA Work Plan. The Prefinal Inspection Report will be a secondary document that will include the following:

   - Inspection checklist
   - Discussion of findings
   - Outstanding RA requirements
   - Corrective action plans
   - O&M Plan update, if necessary
   - Final inspection date.

4. **Final Inspection Report or RA Report.** A single RA Report will be prepared for OU 1-07B after all components of the remedy have been implemented and are operational. For earlier components of the remedy a Final Inspection Report for each of the components will be prepared and submitted. Each of the earlier final inspection reports will be updated as necessary and incorporated into the RA Report. In accordance with FFA/CO Section XII, the draft RA Report will be submitted within 60 days after the final inspection of the last RA component. The RA Report will be a primary document with draft, draft final, and final submittals. The milestone date for this document will be established in the RD/RA Work Plan. The report will include the following for all remedy components:

   - Synopsis of the work defined in the RD/RAWP
   - Explanation of any modifications to the RD/RAWP
   - Evaluation of the effectiveness in meeting performance criteria
   - Description of outstanding items from the Prefinal Inspection Report
   - Results of Final Inspection
   - Results of operational testing
   - Summary of data collected during the RA
   - O&M Plan update, if necessary
   - D&D Plan, as necessary

- Certification that the remedy is operational and functional
- Documentation necessary to support deletion of the site from the National Priorities List
- Long-Term Monitoring and Institutional Control Plan.

The draft final and final documents will incorporate and respond to comments on the draft and draft final, respectively.

5. **O&M Report.** At the completion of O&M activities, an O&M Report will be prepared and submitted. Section 12.2 of the FFA/CO requires the draft O&M Report be submitted within 90 days of the completion of O&M activities. This primary document will include a draft, draft final, and final submittals. The report will include:

   - Description of the O&M activities performed
   - Results of site monitoring, verifying that the remedy meets the performance criteria
   - Explanation of additional O&M to be undertaken at the site.

   The draft final and final documents will incorporate and respond to comments on the draft and draft final, respectively. The submittal schedule for this O&M Report will be set in the RA Report.

4.2.4 Phase C Alternate Remedy Implementation

Section 4.1.2.3, Treatability Studies, identifies those alternate technologies that have the potential to replace on of the base case pump and treat remedies. These alternative technologies include the following:

- ISCO or ISB at the Hotspot
- ISB at the Medial Zone
- NA or ISB at the Distal Zone

If a decision is made by the Agencies to replace one of the base case remedies with one of these alternate technologies, then a ROD amendment will be prepared to incorporate the new technology into the ROD and the schedules and deliverables necessary to implement the alternate remedy would be developed. Deliverables would include, as applicable, Preliminary (30%) Design, RD/RAWP, Prefinal Inspection Report, Final Inspection Report, and/or RA Report. The schedule, deliverables, and enforceable submittal dates necessary to implement an alternate technology would be set in the Treatability Study FDR or a revision to this RD/RA SOW as determined by the Agencies.

5. SCHEDULE AND DELIVERABLES

The documents submitted to the EPA and IDHW as deliverables are presented in Table 5-1 with their corresponding submittal dates in accordance with Section XII of the FFA/CO. Milestone deliverable dates presented in Table 5-1 were established in the ROD, in the ESD, in the TEWP, and through dispute resolution.

The RD/RA SOW contains a schedule for RD deliverables through the initiation of RA. A schedule for Phases B and C RD deliverables is provided in Figure 5-1. Additional deliverables, if necessary, may be created in subsequent documents.

The DOE review will be concurrent with the EPA and IDHW review. Documents will have expedited and non-expedited review and revision schedules during Phases A and B. The review periods vary depending on the document. In general, all expedited draft primary documents have a 30-day review, and in some instances the draft final submittal has been eliminated. Draft primary documents (non-expedited) have the standard 45-day review period. Secondary documents will have their standard 30-day review period.

Table 5-1. OU 1-07B deliverables log.

Deliverables	Submittal Planned Date	Submittal Enforceable Date	Review Length (days)	Document Type
RD/RA PLANNING				
Draft RD/RA SOW Revision 5	06/20/97	06/30/97	30	N/A
HOTSPOT CONTAINMENT AND/OR REMOVAL				
Draft Surge & Stress Evaluation Report	10/18/96	N/A	30	Secondary
Second Draft Surge and Stress Evaluation Report	6/29/98	N/A	30	Secondary
NGWTF (30%) Design	(b)	N/A	30	Secondary
Draft RD/RAWP Revision-NGWTF	(b)	(b)	45	Primary
TREATABILITY STUDIES				
Draft Bench Scale[a]	12/01/96	12/15/96	30	Expedited Primary
Draft Pilot Scale[a]	08/11/97	02/11/98	30	Expedited Primary
ISB - 30% Design	10/30/97	N/A	30	Secondary
ISB - 90% Design	01/30/98	N/A	30	Secondary
ISB Field Evaluation Work Plan (Draft)	05/29/98	N/A	30	Secondary
ISCO - 30% Design	10/30/97	N/A	30	Secondary
ISCO - 90% Design	01/30/98	N/A	30	Secondary
ISCO Field Evaluation Work Plan (Draft)	05/29/98	N/A	30	Secondary
NA Field Evaluation Work Plan (Draft)	11/14/97	N/A	30	Secondary
Phase I FDR (Draft)	10/31/99	10/31/99	45	Primary
Phase II FDR (Draft)	01/31/01	01/31/01	45	Primary
DISSOLVED PHASE MEDIAL ZONE GROUNDWATER TREATMENT				
Draft NPTF F&ORs	12/05/97	N/A	45	Disputable
NPTF (30%) Design	09/29/98	N/A	30	Secondary
Draft RD/RAWP-NPTF	04/02/99	04/30/99	45	Primary
DISSOLVED PHASE DISTAL ZONE GROUNDWATER TREATMENT				
DPTU (30%) Design	(b)	N/A	30	Secondary
RD/RAWP DPTU Revision	(b)	(b)	45	Primary
RD/RAWP Revision-TS	(b)	(b)	45	Primary
TS Implementation				

a. The TEWP was submitted to meet the 12/15/96 enforceable milestone and fulfilled the requirements for submittal of both the Bench and Pilot Scale Work Plans.
b. To be determined in the Phase I or the Phase II FDR.

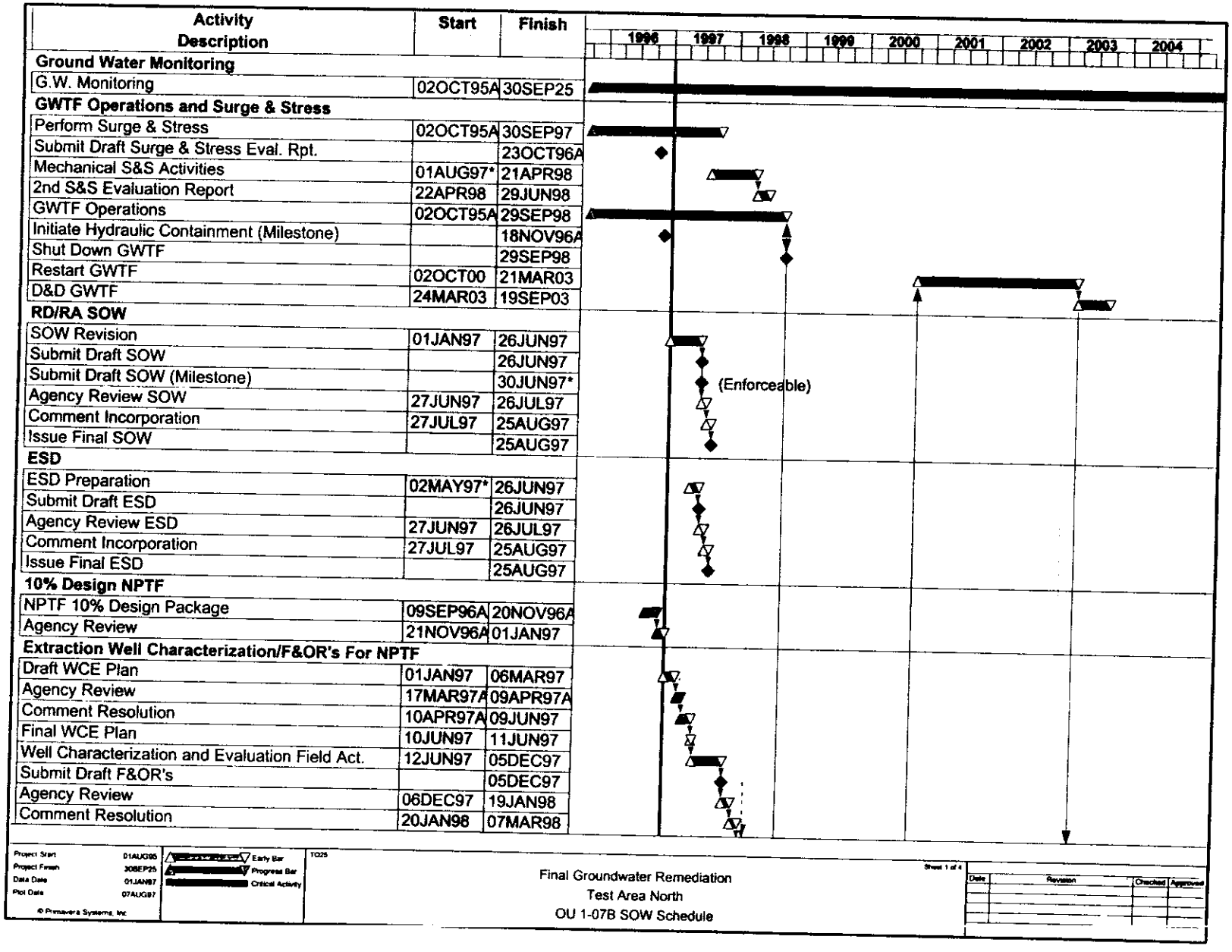

Figure 5-1. Final groundwater remediation TAN OU 1-07B SOW schedule.

Activity Description	Start	Finish
Comment Incorporation	08MAR98	06APR98
Issue Final F&OR's		06APR98
30% Design NPTF		
Life Cycle Cost Analysis	07APR98	05MAY98
Agency Review	06MAY98	04JUN98
Comment Resolution	05JUN98	04JUL98
Agency Decision for Treatment Technology		06JUL98
Prepare 30% Design Package	07JUL98	28SEP98
Agency Review	29SEP98	28OCT98
Comment Resolution	29OCT98	27NOV98
90% Design NPTF		
Prepare 90% Design	30NOV98	19FEB99
RD/RA Work Plan for NPTF		
Prepare RD/RA Work Plan	30NOV98	02APR99
Submit Draft RD/RAWP		02APR99
Submit Draft RD/RAWP (Milestone)		30APR99*
Agency Review	03APR99	17MAY99
Comment Resolution/Revise	18MAY99	01JUL99
Submit Draft Final RD/RAWP		01JUL99
Agency Review	02JUL99	16JUL99
Final Comment Incorporation	17JUL99	31JUL99
Final RD/RAWP		31JUL99
Procure/Construct/Test NPTF		
Procurement Specification/RFP Package	02AUG99	01OCT99
Bid Prep, Evaluation & Award	04OCT99	06JAN00
Long Lead Procurement	07JAN00	06JUN00
Build & Construct Facility	07JUN00	04JAN01
System Testing/Readiness Assessment	05JAN01	08MAR01
NPTF Operations	09MAR01	30SEP25
Treatability Studies		
Initial Evaluations	02OCT95A	31JUL96A
Draft TEWP (MS)		16DEC96A
TEWP Comment Resolution	17DEC96A	25MAR97
TEWP - Final (Resolution Period)	26MAR97	25APR97
Draft Field Demonstration Report - Phase I	30JUN99*	29OCT99
Submit Draft Field Demonstration Report -Phase I		30OCT99*
Agency Review	01NOV99	16DEC99
Comment Resolution	17DEC99	03FEB00
Comment Incorporation	04FEB00	03MAR00
Issue Final Phase I Report		03MAR00
Draft Field Demonstration Report - Phase II	02OCT00	31JAN01

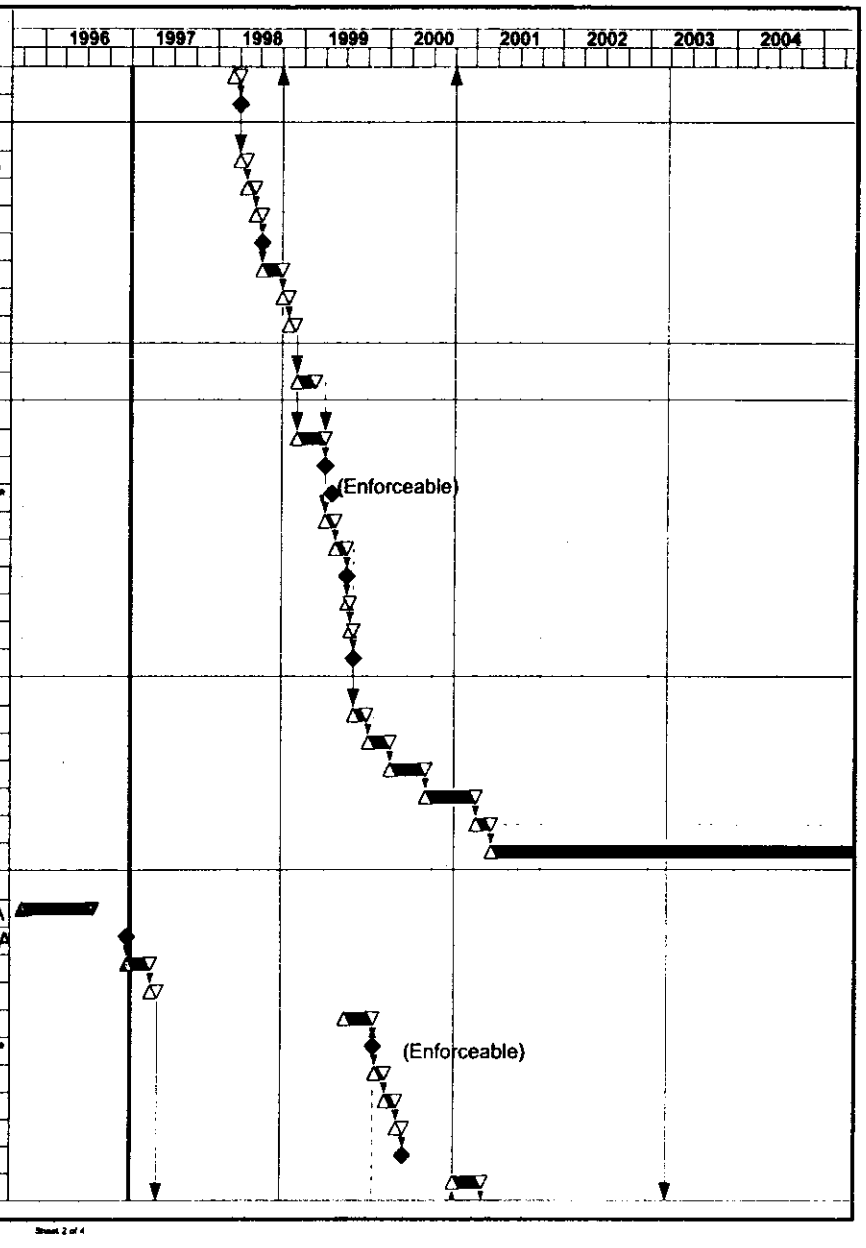

Figure 5-1. (continued).

Activity Description	Start	Finish
Submit Draft Field Demonstration Report-Phase II		31JAN01
Agency Review	01FEB01	20MAR01
Comment Resolution	21MAR01	08MAY01
Comment Incorporation	09MAY01	06JUN01
Issue Final Report		06JUN01
In-Situ Bioremediation (ISB)		
ISB Implementation Plan	06JAN97*	16JUN97
ISB Lab Studies/Hydro Charact.	17JUN97	29MAY98
ISB 30% Design	17JUN97	30OCT97
ISB 30% Design (Milestone)		30OCT97
Agency Review	31OCT97	29NOV97
Comment Resolution	30NOV97	29DEC97
ISB 90% Design	31OCT97	30JAN98
ISB 90% Design (Milestone)		30JAN98
Agency Review	31JAN98	01MAR98
Comment Resolution	02MAR98	31MAR98
ISB Procure and Construct	01APR98	29SEP98
Draft ISB Field Evaluation Work Plan	02FEB98	29MAY98
Draft ISB FEWP (Milestone)		29MAY98
Agency Review	30MAY98	28JUN98
Comment Resolution	29JUN98	28JUL98
Final ISB Field Evaluation Work Plan	29JUL98	27AUG98
ISB Field Implementation	30SEP98	30SEP99
In-Situ Chemical Oxidation (ISCO)		
ISCO Implementation Plan	28APR97	30SEP97
ISCO Lab Studies	01OCT97	29MAY98
ISCO 30% Design	01OCT97	30OCT97
ISCO 30% Design (Milestone)		30OCT97
Agency Review	31OCT97	29NOV97
Comment Resolution	30NOV97	29DEC97
ISCO 90% Design	31OCT97	30JAN98
ISCO 90% Design (Milestone)		30JAN98
Agency Review	31JAN98	01MAR98
Comment Resolution	02MAR98	31MAR98
ISCO Procure and Construct	01APR98	29SEP98
Draft ISCO Field Evaluation Work Plan	11MAR98	29MAY98
Draft ISCO FEWP (Milestone)		29MAY98
Agency Review	30MAY98	28JUN98
Comment Resolution	29JUN98	28JUL98
Final ISCO Field Evaluation Work Plan	29JUL98	27AUG98
ISCO Field Implement @ R.Z.	30SEP98	30SEP99

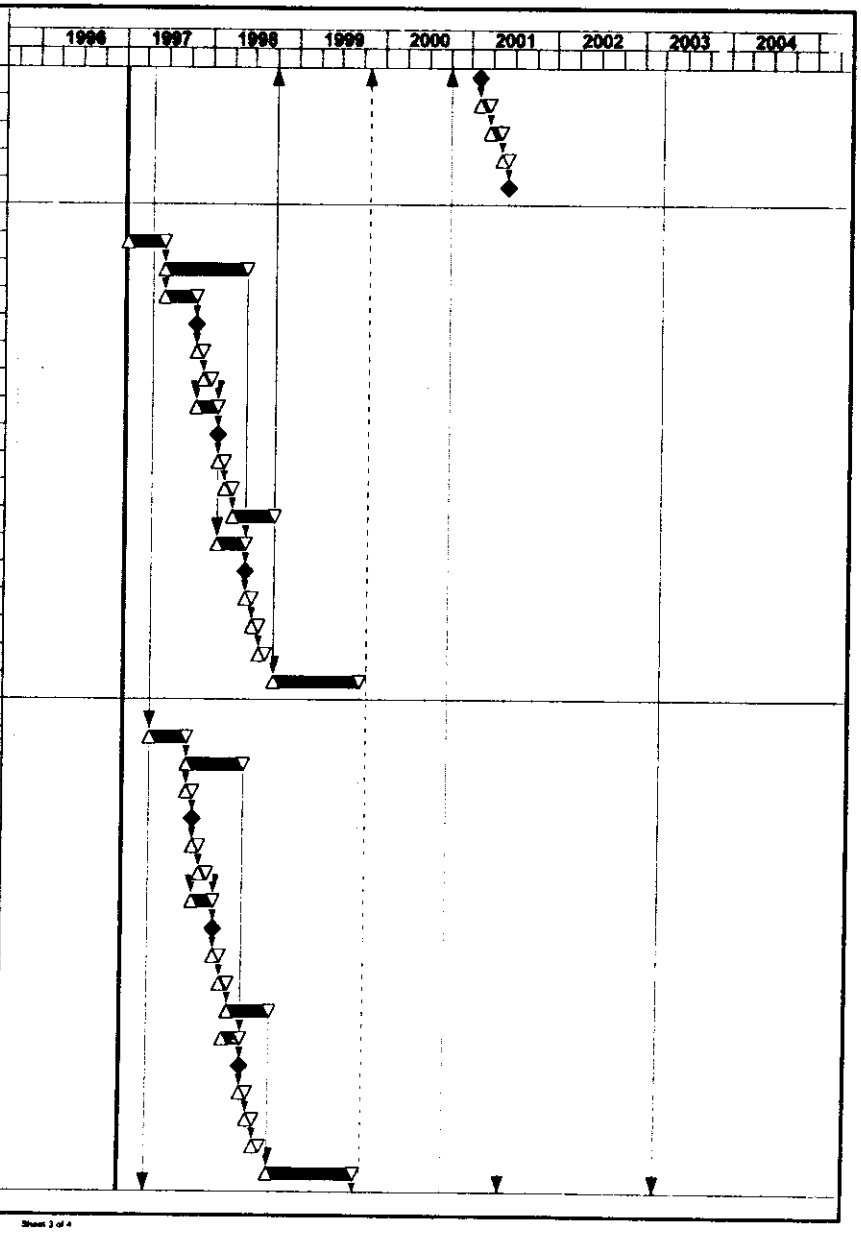

Figure 5-1. (continued).

Activity Description	Start	Finish
ISCO Field Implement @ H.S.	01OCT99	29SEP00
Natural Attenuation (NA)		
Draft Nat.Attenuation Field Evaluation Work Plan	28APR97	14NOV97
Draft NA FEWP (Milestone)		14NOV97
Agency Review	15NOV97	14DEC97
Comment Resolution	15DEC97	13JAN98
Final NA Field Evaluation Work Plan	14JAN98	12FEB98
Natural Attenuation Modelling	28APR97	28OCT97
Natural Attenuation Field Studies	13FEB98	29SEP00
New GWTF For Hotspot		
T.I. Waiver	07JUN01	04FEB02
Prepare 30% Design Package	07JUN01	29AUG01
Agency Review	30AUG01	28SEP01
Comment Resolution	29SEP01	28OCT01
Prepare 90% Design	29OCT01	18JAN02
Prepare Revision to RD/RA Work Plan	21JAN02	24MAY02
Submit Revised RD/RAWP		24MAY02
Agency Review	25MAY02	08JUL02
Comment Resolution/Revise	09JUL02	22AUG02
Submit Draft Final RD/RAWP		22AUG02
Agency Review	23AUG02	06SEP02
Final Comment Incorporation	07SEP02	21SEP02
Final RD/RAWP		21SEP02
New GWTF Construction	23SEP02	21MAR03
New GWTF Operations	24MAR03	22JUL25
DPTU		
Prepare 30% Design Package	07JUN01	29AUG01
Agency Review	30AUG01	28SEP01
Comment Resolution	29SEP01	28OCT01
Prepare 90% Design	29OCT01	18JAN02
Prepare Revision to RD/RA Work Plan	21JAN02	24MAY02
Submit Revised RD/RAWP		24MAY02
Agency Review	25MAY02	08JUL02
Comment Resolution/Revise	09JUL02	22AUG02
Submit Draft Final RD/RAWP		22AUG02
Agency Review	23AUG02	06SEP02
Final Comment Incorporation	07SEP02	21SEP02
Final RD/RAWP		21SEP02
DPTU Construction	23SEP02	21MAR03
DPTU Operations	24MAR03	30SEP25

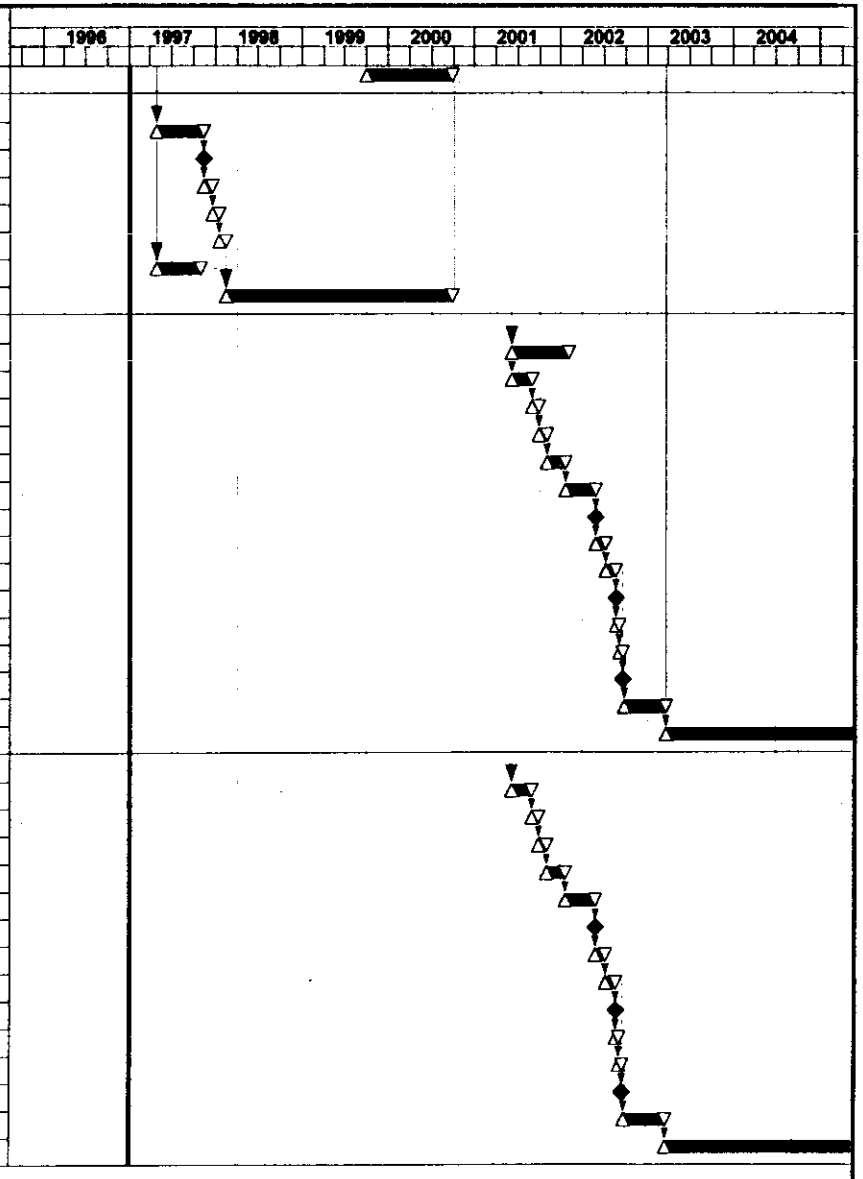

Figure 5-1. (continued).

6. STRATEGY AND PLANS TO EXPEDITE

The goal for implementation of the RA is to perform the work in a timely, cost effective manner. The strategy to accomplish this goal will:

- Use a critical path scheduling process
- Conduct concurrent activities as necessary
- Streamline the document preparation and review process
- Maintain consensus building communications with agencies in order to identify and resolve issues early in the process.

7. COST ESTIMATE

Outyear funding availability for RD/RA projects is subject to congressional approval of DOE budgets. The DOE has identified adequate funding in existing budget plans for this project. Table 7-1 contains the project cost estimate from the OU 1-07B ROD expressed in 1997 dollars. It should be noted that the OU 1-07B ROD cost estimate was prepared using present worth calculations. This estimate and the assumptions contained in it may be used for comparison throughout the project. Depending on the outcome of the interim decision points, the costs are expected to be within -30 to +50% of the actual remediation costs. Cost are not reflective of ESD changes; however, it is expected that the cost will be within the -30 to +50% cost margin. Major potential changes identified in the ESD are replacement of existing GWTF and implementation of a TIW for hotspot containment/restoration.

Per the OU 1-07B ROD, agency notification will be required prior to allocation of contingency, should funds in excess of 90% of the amounts specified for construction, operation, waste handling, or indirects be required to complete identified phases.

The Federal Acquisition Regulations subpart 36.203(c) states that a detailed cost estimate cannot be disclosed to the public until the contract is awarded. The RD/RA SOW is a public document. A detailed construction cost estimate will be developed during the RD and will be used to verify the accuracy of any selected subcontractors' RA cost estimates.

Table 7-1. OU 1-07B cost summary[a].

Activity	Construction	O&M	Waste Handling and Disposal	Indirects[b]	Contingency	Subtotal
			PHASE A			
RD/RA Scope & OU 1-07B ROD Revisions	N/A	N/A	N/A	$477,405	$53,045	$530,450
			PHASE B			
Continuing Operation of GWTF	$827,502	$2,381,721	$761,726	$2,192,880	$1,232,766	$7,396,595
Treatability Studies/Support Activities	N/A	$335,244	N/A	$1,856,575	$1,113,945	$3,305,764
Bench Scale Testing	N/A	$773,396	N/A	N/A	N/A	$773,396
Pilot Scale Testing	$941,018	$1,188,208	$66,837	N/A	N/A	$2,196,063
			PHASE C			
Final Remediation Technology Implementation and Operation	$3,319,556	$12,878,265	$1,404,632	$8,621,934	$5,983,476	$32,207,863
			MONITORING			
Monitoring		$4,105,683				$4,105,683
TOTAL COST FY 1997 DOLLARS	$5,088,076	$21,662,517	$2,233,195	$13,148,795	$8,383,232	$50,515,814

a. The dollars shown in the cost summary are from the OU 1-07B ROD. The OU 1-07B ROD presents the amounts in present worth, this table is in 1997 dollars. The amounts assume Phase C default pump and treat. Cost updates are being prepared to reflect new cost based on revised scope of work.

b. The indirect cost include project management, construction management, facility/project design and inspections.

8. REGULATORY REQUIREMENTS

Under CERCLA Section 121, response actions conducted entirely on-site are exempt from obtaining federal, state, or local permits. These actions are, however, required to comply with the substantive aspects of the ARARs specified for the site. The selected remedy will comply with the ARARs specified in the OU 1-07B ROD. The RD/RAWP for each phase will demonstrate how ARARs pertinent to the work performed will be met in accordance with Section 7.7(b) of the FFA/CO and Section 2.12 of the Action Plan. The design documents will address the substantive aspects of the identified ARARs and describe how the RA will comply with the requirements. Appendix A contains the ARARs for this action and the proposed implementation strategy.

In accordance with Section 7.7(a) of the FFA/CO, federal and state permits which would be required if the RA were not conducted under CERCLA must be noted. These permits are listed in Table 8-1.

Table 8-1. List of permits.

Activity	Agency	Permit
Operate Treatment Facility	IDHW Division of Environmental Quality (DEQ), Air Quality	Air quality for fugitive and toxic emissions
Operate Treatment Facility	EPA Region 10	National Emission Standard for Hazardous Air Pollutants approval for radionuclide emissions
Operate Resource Conservation and Recovery Act (RCRA) Storage Facility	IDHW, DEQ, Hazardous Waste	Hazardous Waste Management Act Permit
Operate RCRA Treatment Facility	IDHW, DEQ, Hazardous Waste	Hazardous Waste Management Act Permit
Discharge of Treated Effluent to Injection Well	IDHW, IDWR, Water Quality	Underground Injection Control Program Permit
Closure RCRA Storage Facility	IDHW, DEQ, Hazardous Waste	RCRA Closure Permit
Closure RCRA Treatment Unit	IDHW, DEQ, Hazardous Waste	RCRA Closure Permit

9. DESIGN APPROVAL PROCEDURES AND REQUIREMENTS

The procedures and requirements for obtaining approval of the design documents will follow those outlined in the FFA/CO. The various deliverables identified in Section 4.0 will be reviewed for the following elements:

- Compliance with ARARs
- Use of currently accepted environmental control measures and technology
- The adequacy of the design plans
- Consistency with the OU 1-07B ROD
- Environmental impacts
- Implementability
- Cost estimate completeness
- Utilization of currently accepted practices and techniques.

The DOE shall have the authority to approve and accept the design and must obtain concurrence from the EPA and IDHW.

10. CORRELATION BETWEEN PLANS AND SPECIFICATIONS

General correlation between the drawings and the technical specifications will be ensured through the project procedures. All drawings and specifications will be subjected to checks by the RD/RA contractor prior to approval and issue. Subsequent revisions incorporating major changes will also be checked prior to approval and issue. Any changes made after final approvals and signatures will require a review and approval by the same individuals that performed the original review and approval, or their designees. The check will include Environment, Safety, and Health; and Quality Assurance reviews. The checking process is a documented verification of the completeness and correctness of a drawing and serves to:

- Ensure that the drawing reflects the design intent as expressed in design input documents, calculations, and sketches
- Verify that the drawing expresses the requirements of the codes and standards in the design criteria
- Resolve any conflict between the data shown on the drawings and specifications and data included in other pertinent drawings or the specifications
- Ensure that the information is presented clearly, completely, and accurately.

Drawings and technical specifications will be coordinated and consistent. The subsequent design submittals will build upon the initial design submittals.

11. COMMUNITY RELATIONS PLAN

The requirements for RD/RA elements of the Community Relations Plan are found in Part 300.435 (c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The INEEL Community Relations Plan was prepared in accordance with the NCP. The INEEL Community Relations Plan describes both the NCP required RD/RA community relations activities, and additional INEEL-specific activities, which may occur during the course of this project. The OU 1-07B RA will be conducted in accordance with the INEEL Community Relations Plan.

12. REFERENCES

Office Of Solid Waste And Emergency Response Directive 9355.3-02, 1989 *Interim Final Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment*, Office of Solid Waste and Emergency Response, EPA, Washington, DC, June 1989.

Office Of Solid Waste And Emergency Response Directive 9380.3-10, 1992 *Final Guide for Conducting Treatability Studies under CERCLA*, Office of Solid Waste and Emergency Response, EPA, Washington, DC, October 1992.

Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, December 1991.

Action Plan for Implementation of the Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, December 1991.

DOE-ID/12583-152, *Remedial Design and Remedial Action Guidance for the Idaho National Engineering Laboratory*, Revision 1, U.S. Department of Energy, Idaho, October 1993.

Draft Explanation of Significant Differences, U.S. Department of Energy, Idaho, June 1997.

Record of Decision, Declaration for the Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23) and Miscellaneous No Action Sites Final Remedial Action, Operable Unit 1-07B, Waste Area Group 1, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, August 1995.

Record of Decision, Technical Support Facility Injection Well (TSF-05) and Surrounding Groundwater Contamination (TSF-23), Operable Unit 1-07A, Waste Area Group 1, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, September 1992.

Final Sampling, Analysis, and Test Plan for Test Area North Phase 0 Activities, Operable Unit 1-07A, Revision 4, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, May 1995.

Test Area North Groundwater Interim Action, Operable Unit 1-07A Final Remedial Design, Revision 3, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, December 1993.

Final Remedial Action Work Plan, Test Area North Groundwater Interim Action Operable Unit 1-07A, Revision 3, 01.07A.2.1.201.01, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, November 1993.

EGG-ER-10643, *Remedial Investigation Final Report with Addenda for the Test Area North Groundwater Operable Unit 1-07B at the Idaho National Engineering Laboratory*, Revision 0, U.S. Department of Energy, Idaho, January 1994.

EGG-ER-10802, *Feasibility Study Report for Test Area North Groundwater Operable Unit 1-07B at the Idaho National Engineering Laboratory*, Revision 0, U.S. Department of Energy, Idaho, January 1994.

Final Progress Report for Batches 1 through 31 Test Area North Groundwater Interim Action Operable Unit 1-07A, Revision 3, Idaho National Engineering Laboratory, U.S. Department of Energy, Idaho, April 1995.

APPENDIX A

Compliance with Regulatory Requirements

Table A-1. Compliance with regulatory requirements.

Category	Regulatory Requirements	Implementation Strategy
Chemical - Air Discharges (Carcinogens and Noncarcinogens)	Idaho Toxic Air Pollutants For all sources constructed or modified since May 1, 1994, the net screening emissions levels (EL) and net acceptable ambient concentrations (AAC) for non-carcinogens which are not specifically controlled elsewhere in Idaho Administrative Procedures Act (IDAPA) regulation will comply with the table identified in IDAPA 16.01.01.585. For all sources constructed or modified since May 1, 1994, the net screening ELs and AAC for carcinogens which are not specifically controlled elsewhere in these rules, are as provided in the table identified in IDAPA 16.01.01.586. IDAPA 16.01.01.585 and IDAPA 16.01.01.586.	Compliance with air discharge limits will be demonstrated through existing air modeling results. For the GWTF, modeling was performed for the ROD, and the limits established in that document will be complied with. The compliance monitoring point for the GWTF is sample point 6, after the second carbon bed. Any changes to the GWTF air stream treatment system will be evaluated. If the changes warrant new modeling, an EPA approved air modeling program, or engineering calculations will be performed. For air emissions on future treatment systems, modeling will be performed using an EPA approved air modeling program, or engineering calculations will be performed.

Category	Regulatory Requirements	Implementation Strategy
Chemical - Air Discharges (Radionuclide) To-Be-Considered Radiation Protection	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/year. IDAPA 16.01.01.591 {40 CFR 61.92} Establishes standards and requirements for operations of the DOE and DOE contractors with respect to protection of members of the public and the environment against undue risk from radiation. Includes narrative and numerical standards (air and water) for management of radioactive liquid effluent and radiation protection of the public. In addition, the Order provides radiological protection requirements and guidelines for cleanup of residual radioactive material and management of the resulting wastes and residues, and release of property. DOE Order 5400.5 (To Be Considered)	Emissions from the treatment operations and any construction project(s) will either be calculated as provided under the provisions of 40 CFR 61.93 or estimated through the use of an EPA approved air modeling program.

Category	Regulatory Requirements	Implementation Strategy
Chemical - Drinking Water Standards (MCLs)	The following are the MCLs per Federal and State drinking water standards, in effect on the date of ROD signature. Organics — MCL (µg/L) PCE — 5 TCE — 5 cis-DCE — 70 trans-DCE — 100 The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 mrem/year. Radionuclides — MCL (pCi/L) Cesium-137 — 119[3] Tritium — 20,000 Strontium-90 — 8 Uranium-234 — 30 pCi (proposed)[1] IDAPA 16.01.08.050.02 and .05 {40 CFR 141.12 and .16}	An evaluation of the aquifer will be performed for comparison to MCLs. This will be accomplished through groundwater monitoring and analysis of data for trending to determine if the aquifer can be restored to MCLs within the established reasonable time period of interest (100 years) after ROD signature. If any new radionuclides are identified without existing MCLs, calculations will be performed to estimate radionuclide uptake. Then a back calculation to determine maximum radionuclide activities will be performed, and annual maximum inputs determined.

[3]The proposed MCL for U-234 is for the U-234, -235, and -238 series. The proposed MCL for Cs-137 is derived from a corresponding 4 rem/yr effective dose equivalent to the public, assuming daily intake of 2 L/day of water.

Category	Regulatory Requirements	Implementation Strategy
Action - Air Discharges (Monitoring)	To determine compliance with the standard, radionuclide emissions shall be estimated and effective dose equivalent values to members of the public calculated using engineering evaluations, computer models (such as CAP-88 or AIRDOS-PC), or other procedures for which EPA has granted prior approval. IDAPA 16.01.01.591 {40 CFR 61.93}	It is assumed that tritium is the only radionuclide which would be emitted through the GWTF stack. Radionuclide emissions are estimated by taking an average tritium concentration (from groundwater monitoring data), and the annual volume of water emitted from the GWTF stack to calculated an annual release of Tritium. It is assumed that tritium is the only radionuclide of concern in the air emission. Emissions for new treatment systems will be calculated in a similar manner for project annual emissions. Emission levels in conjunction with OU 1-07B operations will not cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/year.
Action - Fugitive Dust	All reasonable precautions will be taken to prevent the generation of fugitive dust. IDAPA 16.01.01.651 identifies examples of reasonable precautions for preventing fugitive dust. IDAPA 16.01.01.650 and .651	During construction activities, all reasonable precautions will be taken to minimize fugitive dust through application of engineering controls. Potential options include: 1) Use of water sprays and dust suppressants 2) Halting construction activities during periods of high winds.

Category	Regulatory Requirements	Implementation Strategy
Action - Hazardous Waste Determination	A person who generates a solid waste must determine if the waste is a hazardous waste by using the following method: 1) Determine if the waste is excluded under (40 CFR 261.4) 2) Determine if the waste is listed as a hazardous waste in 40 CFR 261, Subpart D 3) For the purposes of compliance with 40 CFR part 268, or if the waste is not listed in subpart D of 40 CFR part 261, the generator must then determine whether the waste is identified in subpart C (characteristic) of 40 CFR part 261. IDAPA 16.01.05.006 {40 CFR 262.11} Chapter III, 3.d - Waste characterization activities will accurately permit the proper segregation, treatment, storage, and disposal of the low level waste. Characterization will include a determination for solid waste, listed waste, characteristic hazardous components, and applicable Land Disposal Regulation (LDR) requirements. DOE Order 5820.2A (To Be Considered)	Any waste streams generated during the remediation process for storage and/or disposal will have a hazardous waste determination performed. For GWTF waste streams, established characterization information will be used. If needed, sampling will be conducted in accordance with a task specific sampling and analysis plan. Waste minimization activities will be implemented in accordance with the INEEL Reusable Property, Recycle Materials and Waste Acceptance Criteria. Trained personnel will inspect and ensure the storage facility is in compliance with all applicable regulations.

Category	Regulatory Requirements	Implementation Strategy
Action - General Waste Analysis	General facility standards require that operators of a facility must obtain chemical and physical analyses of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility prior to treatment, storage, or disposal. The analysis may include existing published or documented data on the hazardous waste or on hazardous waste generated from a similar processes. At a minimum, the analysis must contain all the information which must be known to treat, store, or dispose of the waste in accordance with this part and part 268 of this chapter. IDAPA 16.01.05.008 {40 CFR 264.13} DOE 5820.2A (To Be Considered)	Waste stream management requirements are based on analysis supported by a project sampling and analysis plan and process knowledge. This information will provide the basis for determining: container requirements, storage requirements, labeling requirements, and treatment and disposal requirements. All waste (both radionuclide and VOC) generated during remediation operations will be managed through facility procedures in accordance with the INEEL Reusable Property, Recycle Materials and Waste Acceptance Criteria.
Action - Facility Design and Operation	Treatment, Storage, and Disposal (TSD) operators must design, construct, maintain and operate facilities to minimize the possibility of fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil, or surface water which might threaten human health or the environment. IDAPA 16.01.05.008 {40 CFR 264.31 through .35 and .37}	Existing facilities will continue to be designed, inspected and operated in compliance with site procedures and the requirements of this section. New treatment systems and any modifications to existing facilities as well as current operations will consider the design and operational requirements of these sections when developing the design requirements.

Category	Regulatory Requirements	Implementation Strategy
Action - Closure Performance Standards	The owner or operator must close the facility in a manner that: 1) Minimizes the need for further maintenance, 2) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and 3) Complies with the closure requirements of this subpart. IDAPA 16.01.05.008 {40 CFR 264.111} During the partial and final closure periods, all contaminated equipment, structures and soils must be properly disposed of or decontaminated unless otherwise specified in Sections 264.197, 264.228, 264.258, 264.280 or Section 264.310. By removing any hazardous wastes or hazardous constituents during partial and final closure, the owner or operator may become a generator of hazardous waste and must handle that waste in accordance with all applicable requirements of part 262 of this chapter. IDAPA 16.01.05.008 {40 CFR 264.114}	Once remediation activities have achieved compliance with remediation goals, closeout procedures will be implemented. An evaluation of the equipment and storage areas will determine closure requirements and management of the materials, pump and treat equipment, and associated ancillary piping. Emphasis will be placed on minimal site O&M at completion of closure. All equipment, materials, and associated debris generated during project closeout will be adequately characterized to determine waste management requirements.

Category	Regulatory Requirements	Implementation Strategy
Action - Container Management	1) Remediation wastes will be kept in containers meeting the requirements of 40 CFR 264.171; 2) Wastes will be stored with compatible containers; 3) Containers will be properly managed; and 4) The storage facility will be subject to inspections under 40 CFR 264.174. 5) The storage area containment system will be in accordance with 40 CFR 264.175. IDAPA 16.01.05.008 {40 CFR 264 Subpart I}	Characterization results via process knowledge or analytical results will dictate the packaging requirements, determine storage requirements, and compatibility with other wastes. Waste containers will be properly labeled and managed in accordance with existing storage facility procedures. All containerized waste will be subject to RCRA storage facility inspection requirements. The containers are stored on raised grated flooring. The flooring will capture any fluids from a leaking drum. Storage facility egress points have dikes to prevent leakage of liquids. The combination of these two controls will provide adequate containment. Containers used to transport water extracted during groundwater sampling, will not be double walled containers. If water is stored in these containers (>3 days) they will be placed in a container storage area with secondary containment. Any new treatment systems and any future facility modifications will be designed to provide adequate containment.

Category	Regulatory Requirements	Implementation Strategy
Action - Tank Systems	The tank system utilized in processing the remediation waste streams generated during remediation operations will comply with the tank system requirements under 40 CFR 264 Subpart J which includes: 1) Assessment of the tank's system integrity; 2) Containment and detection of releases; 3) General operating requirements; 4) Inspections; 5) Response to leaks or spills; and 6) Closure and Post-Closure care. IDAPA 16.01.05.008 {40 CFR 264 Subpart J}	The GWTF will use existing tank systems per the OU 1-07A RD/RAWP. The tank systems will be inspected once per operating day. The inspection will check for visible and leakage and signs of corrosion, and will also check the leak detection system for indications of leakage. Any new treat systems and any future facility modifications will be designed to address the need for adequate containment and regulatory requirements. Any deviations from strict regulatory requirements will be defined based on level of risk and agency concurrence. All new tanks used in any new remediation facilities will be certified by an independent qualified registered professional engineer attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating hazardous waste.

Category	Regulatory Requirements	Implementation Strategy
Action - Miscellaneous Units	A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Permits for miscellaneous units are to contain such terms and provisions as necessary to protect human health and the environment, including, but not limited to, as appropriate, design and operating requirements, detection and monitoring requirements, and requirements for responses to releases of hazardous waste or hazardous constituents from the unit. Permit terms and provisions shall include those requirements of Subparts I through O of this part, part 270, and part 146 that are appropriate for the miscellaneous unit being permitted. IDAPA 16.01.05.008 {40 CFR 264 Subpart X}	An evaluation will be conducted to determine the continued applicability of Subparts I through O to the system for any future modifications.

Category	Regulatory Requirements	Implementation Strategy
Action - Emission Standards (Process Vents)	The owner or operator of a facility with process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations managing hazardous wastes with organic concentrations of at least 10 ppmw shall either: (1) Reduce total organic emissions from all affected process vents at the facility below 1.4 kg/h (3 lb/h) and 2.8 Mg/yr (3.1 tons/yr), or (2) Reduce, by use of a control device, total organic emissions from all affected process vents at the facility by 95 weight percent. (b) If the owner or operator installs a closed-vent system and control device to comply with the provisions of paragraph (a) of this section the closed-vent system and control device must meet the requirements of Section 264.1033. (c) Determinations of vent emissions and emission reductions or total organic compound concentrations achieved by add-on control devices may be based on engineering calculations or performance tests. If performance tests are used to determine vent emissions, emission reductions, or total organic compound concentrations achieved by add-on control devices, the performance tests must conform with the requirements of Section 264.1034(c). IDAPA 16.01.05.008 {40 CFR 264 Subpart AA}	For units with greater than 10 ppmw influent waste streams, the INEEL will comply with the 3 lb/hr and 3.1 tons/yr limit. At this time, the GWTF is the only active INEEL unit with the planned potential for a greater than 10 ppmw influent waste stream. In the event that other units begin operations at the INEEL with influent waste streams of greater than 10 ppmw, the issue will be revisited. Engineering calculations and/or effluent monitoring will demonstrate compliance with the facility standard. If organic concentration exceeds 10 ppmw, potential controls include: 1) Implementation of additional controls or modification of the treatment process to meet acceptable levels; and 2) Installation of a closed vent system per the requirements identified in 40 CFR 264.1034 (c). The treatment facility operations will comply with the test methods and procedure requirements provided in section 264.1034, test methods and procedures. Deviations to these requirements will be noted in the Sampling and Analysis Plans. New Treatment Systems will be required to comply with IDAPA 16.01.05.008 {40 CFR 264 Subpart AA}, only when system influent is greater than 10 ppmw.

Category	Regulatory Requirements	Implementation Strategy
Action - Land Disposal Restrictions	IDAPA Regulation 16.01.05.011 identifies that all of 40 CFR Part 268 and all Subparts are herein incorporated by reference as provided in 40 CFR, revised as of July 1, 1994, except for 40 CFR Parts 268.5, 268.6, 268.42(b) and 268.44. Except as specifically provided otherwise in this part or part 261 of this chapter, the requirements of this part apply to persons who generate or transport hazardous waste and owners and operators of hazardous waste treatment, storage, and disposal facilities. Restricted wastes may continue to be land disposed as follows: 1) Where persons have been granted an extension to the effective date of a prohibition under subpart C of this part or pursuant to Section 268.5, with respect to those wastes covered by the extension; 2) Where persons have been granted an exemption from a prohibition pursuant to a petition under Section 268.6, with respect to those wastes and units covered by the petition; 3) Wastes that are hazardous only because they exhibit a hazardous characteristic, and which are otherwise prohibited from land disposal under this part, are not prohibited from land disposal if the wastes: a) Are disposed into a nonhazardous or hazardous injection well as defined in 40 CFR 144.6(a); and b) Do not exhibit any prohibited characteristic of hazardous waste at the point of injection; and c) If at the point of generation the injected wastes include D001 High TOC subcategory wastes or D012-D017 pesticide wastes that are prohibited under Section 148.17(c) of this chapter, those wastes have been treated to meet the treatment standards of Section 268.40 before injection.	Wastes generated as a result of remediation efforts will be characterized for determining management requirements. Additionally, each waste stream will be evaluated to determine the applicability of LDRs. Waste streams subject to LDRs will be segregated and consolidated with compatible waste streams, as appropriate, when similar treatment technologies can be utilized. Waste streams generated from implementation of treatment technologies will be captured and appropriately managed based on classification.

Category	Regulatory Requirements	Implementation Strategy
Action - Water Quality (Construction and Use of Injection Wells)	The requirements of this state regulation apply to the owner or operator who constructs and operates the GWTF. IDAPA 37.03.03 Section 3020 of RCRA	Any changes to the facility design will incorporate the substantive requirements specified within this IDAPA regulation. (The operation of the GWTF will implement Best Control Technologies to achieve maximum effectiveness from the treatment system. The operation of the GWTF will result in both VOCs and radionuclides being reinjected to the aquifer above MCLs.) Although contaminant concentrations in reinjected groundwater may exceed drinking water standards, the selected remedy employs an extraction, treatment, and reinjection process that substantially improves aquifer water quality. Any new treatment systems will be designed to treat VOCs to below MCLs.

Category	Regulatory Requirements	Implementation Strategy
Action - Water Quality (Monitoring)	Monitoring, record keeping and reporting may be required if the well could adversely affect a drinking water source or if injecting a contaminant that could have an unacceptable effect upon the quality of the ground waters of the state. The state may require where appropriate, but is not limited to, the following: 1) Any injection authorized by the state shall be subject to monitoring and record keeping requirements as conditions of the permit; 2) The frequency of required monitoring shall be specified in the permit; 3) All monitoring tests and analysis required by permit conditions shall be performed in a state certified laboratory or other laboratory approved by the state; 4) Any field instrumentation used to gather data, when specified as a condition of the permit, shall be tested and maintained in such a manner as to ensure the accuracy of the data; and 5) All samples and measurements taken for the purpose of monitoring shall be representative of the monitoring activity and fluids injected. IDAPA 37.03.03.055.01	The existing site monitoring program meets the substantive requirements of the IDAPA regulation as well as achieving compliance with the requirements that would be required in the groundwater injection permit.

Category	Regulatory Requirements	Implementation Strategy
To-Be-Considered Fire Protection	Under this DOE requirement, the facility will: 1) Minimize the potential for the occurrence of a fire. 2) Ensure that fire does not cause an on-site or off-site release of radiological and other hazardous material that will threaten the public health and safety or the environment. 3) Establish requirements that will provide an acceptable degree of life safety to DOE and contractor personnel and that there are no undue hazards to the public from fire and its effects in DOE facilities. 4) Ensure that process control and safety systems are not damaged by fire or related perils. 5) Ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and its effects. 6) Ensure that property damage from fire and related perils does not exceed an acceptable level. DOE Order 5480.7A (To Be Considered)	Modification to existing facilities or the design of new facilities will consider Instrumentation/Environmental/Fire Protection requirements that are consistent with current INEEL requirements and existing RCRA Part B requirements.

Category	Regulatory Requirements	Implementation Strategy
Location - General Facility Standards. Radioactive Waste Management (Site Selection)	Seismic considerations for portions of new facilities where treatment, storage, or disposal of hazardous waste will be conducted must not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time. A facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or any hazardous waste by a 100-year flood, unless the owner or operator can demonstrate to the Regional Administrator's satisfaction that: (i) Procedures are in effect which will cause the waste to be removed safely, before flood waters can reach the facility, to a location where the wastes will not be vulnerable to flood waters; or (ii) For existing surface impoundments, waste piles, land treatment units, landfills, and miscellaneous units, no adverse effects on human health or the environment will result if washout occurs. IDAPA 16.01.05.008 [40 CFR 264.18(a) and (b)] DOE Order 5820.2A Chapter III, 3.i (7) - The disposal site selection will be based on evaluation of prospective sites in conjunction with the planned waste confinement technology, and in accordance with the National Environmental Policy Act of 1969 (NEPA) process. The site will have hydrogeologic characteristics in conjunction with the confinement technology that will protect the groundwater. The potential for natural hazards such as floods, erosion, tornadoes, earthquakes, and volcanoes will be taken into consideration during site selection. The siting criteria will also take into account future land use resource development plans, current and projected populations, nearby public facilities, utilities, and the location of waste generation.	Construction activities involving siting a facility will take into consideration: · Site hydrology, geology, and waste characteristics; · Compliance with the NEPA process; · Potential sites must be evaluated for natural hazards such as floods, erosion, tornadoes, earthquakes, and volcanoes; · Areas subject to surface geological processes (i.e., mass wasting, erosion, slumping, landslides, and weathering) which significantly affect the ability of the disposal facility to meet the performance objectives will be avoided; and · Areas that contain known natural resources which, if exploited, cause a failure of the disposal facility cover such that the performance objectives would not be meet, are to be avoided. Current analysis indicates that the TAN facility is not within a 100 year floodplain. If new information indicates otherwise, appropriate precautions will be included in the design.

Category	Regulatory Requirements	Implementation Strategy
Location - Historic Preservation	The Secretary of the Interior must be notified in writing whenever DOE finds or is notified in writing by an appropriate historical or archaeological authority that the activities in connection with a project may cause irreparable loss or destruction of significant scientific, prehistorical, historical, or archaeological data. Any data that may be lost or destroyed must be preserved by the DOE or the Department of Interior. 36 CFR 800.4(a)(1)(i),(iii)(a)(2); and 36 CFR 800.4(b)	Any expansion to existing facilities or the siting of new facilities will be surveyed to determine any impacts to historical sites.